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WHITEFISH IN THE GREAT LAKES

FISH CULTURE IN CANADA

FISHERIES OF PRINCE ED- WARD ISLAND, MANITOBA

AND

BRITISH COLUMBIA

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LANDS, FISHERIES, GAME AND MINERALS

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WHITEFISH IN THE GREAT LAKES

BY

C. W. GAUTHIER

FISH CULTURE IN CANADA

FISHERIES OF PRINCE EDWARD ISLAND

BY

E. T. CARBONELL

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WHITEFISH IN THE GREAT LAKES

By C. W. GAUTHIER

It was considered desirable to obtain the views of an experienced operator on this subject, and Mr. Gauthier kindly consented to contribute the following article. His views are submitted for consideration.—Editor.

In considering the question of the supply of whitefish in the Great lakes the recommendations made by Frank N. Clark, of the United States Fish Commission, at the International Fisheries Convention held at Washington in September, 1908, are worthy of attention. Mr. Clark, who is an expert fish culturist, recommended that from two to five billion whitefish fry be propagated yearly on each side of the Great lakes, and stated that, if this were done, the fish would soon become as abundant as in former years. He also recommended that the present hatcheries be enlarged and new ones having large capacity be built, so that a close season would be practically unnecessary. The artificial propagation and introduction of whitefish into lake Erie and the Detroit river, he said, had increased the catch in recent years. He believed that, if a close season must be enforced, it should be changed from November to July and August, when the water is warm and the fish, consequently, are in poor condition for the market. Hon. Seymour Bowers, of the Michigan Fisheries Commission, Prof. James Nevin, of the Wisconsin Fish Commission, Prof. Downing, of the United States Fish Commission, and the majority of those present agreed with the views above quoted.

The principal causes for the depletion of whitefish in the Great lakes are (1) The use of large numbers of gill nets set upon the feeding grounds in deep waters, where they catch only the whitefish and trout; (2) the soft fish which frequent the shallow water are not caught in these deep water nets; consequently when the whitefish come into the shallow waters to spawn, these soft fish, such as herring, mullets, pike, perch and pickerel, prey upon the eggs and upon the young whitefish.

The remedy for this depletion is the building of new hatcheries and the enlargement of present hatcheries to make it possible to increase the output to two billions of whitefish fry yearly, for the Great lakes. The use of pound nets should be encouraged because these nets can be set only in shoal waters and will catch large quantities of the aforementioned soft fish and pickerel, which prey upon the whitefish and their eggs. The taking ashore of all fish caught in the pound nets, except immature white-

fish, should be made compulsory. The propagation of salmon trout should be discontinued as they are of less commercial value than whitefish and cost ten times more per million to propagate. When trout are mature, they devour the whitefish, both grown and immature.

The Lake Erie and Detroit River whitefish are the finest quality in North America, being the whitest in color and the finest in flavour. For this reason, as much spawn as possible should be collected each year from the fisheries in lake Erie and Detroit river for propagation in the hatcheries to replenish the Great lakes. With proper arrangement several hundred millions of whitefish eggs could be obtained each year. In former years, money has been spent in procuring eggs of inferior quality from the bay of Quinte. These eggs were sent to Sandwich hatchery for propagation, when sufficient eggs of good quality could have been obtained from the Detroit river to have completely filled the Sandwich and Sarnia hatcheries and for less money per million than was spent in obtaining eggs from the bay of Quinte. The amount obtained from the bay of Quinte was so small that the Sarnia hatchery was closed during 1909, and the Sandwich hatchery had to operate at only partial capacity. In three years, 1901, 1902 and 1907, ninety million eggs were sent from the Detroit River fisheries to the Selkirk, Manitoba hatchery, where the whitefish are worth to the fisherman only 3c. per lb., while, according to the reports of the Department of Marine and Fisheries, they are worth 10c. here. This will show the necessity for the enlargement of our present hatcheries and the establishment of new ones, as the 90,000,000 eggs sent out of the Province were badly needed in Georgian bay. In the years 1897, 1901, 1906 and 1908, eggs were not supplied to the Selkirk hatchery, nor were they supplied to the Berens River hatchery in 1908. So few eggs were provided for the Selkirk hatchery that only 289,000,000 fry was the total output for sixteen years, while the capacity for that time was 1,440,000,000 eggs.

The whitefish of the Great lakes is the most valuable commercial fish in Canada. Those weighing 4 lb. and upward are sold as high as \$25 to \$30 per 100 lbs. and are used as planked whitefish. The Department should obtain eggs from the large variety and propagate them for market in large cities. The Department should have the advice of a practical experienced fisherman; one who is thoroughly versed in the various kinds of fish, their habits, the localities which they frequent, the kinds of nets used in the Great lakes and rivers, and the propagation and preservation of the most valued kinds of fresh-water fish. The first consideration should be the building of hatcheries and the enlargement of old hatcheries, and the systematic gathering of spawn, yearly. The Department has never placed whitefish fry in lake Superior, Georgian bay, or the Manitoulin Island district, and has planted in the southern portion of

lake Huron during the past ten years the fry from only 3,000 fish. For the upper lakes, hatcheries should be established at Port Arthur, Sault Ste. Marie, Collingwood, Owen Sound and Southampton. The hatchery at Wiarton should propagate whitefish eggs only. In the past, this hatchery has propagated salmon trout, the most voracious of fish, which devours both young and mature whitefish.

For lakes Erie and Ontario, hatcheries should be established at Kingsville, and at one or two other places such as Hamilton, Port Hope, Kingston or Belleville.

The writer could this year provide 2,000,000,000 or upwards of whitefish eggs at less than one-half the cost per million, on the average, than has been expended during the past eight years to provide an insufficient quantity for the Sandwich and Sarnia hatcheries.

During the past four years, about 80,000 whitefish have been caught in the bay of Quinte. The rocky and gravel beaches have so injured these fish that only about 185,000,000 eggs were procured instead of the 900,000,000 which that number of fish should have yielded. These eggs, taken from fish of the inferior dark-scale variety, were brought at unnecessary expense to the Sandwich hatchery. This surely shows mismanagement, when large quantities of superior quality were obtainable from the Detroit river, at the very doors of the Sandwich hatchery, especially as eggs from an inferior quality fish such as those of lake Ontario should not be planted among the finest quality whitefish in Canada, where they will increase in numbers to the detriment of the superior species. During the same four years, the Department planted in lake Ontario the progeny of less than eight hundred whitefish.

The increased catch of whitefish in recent years in lake Erie and the Detroit river is proof of the benefit of hatcheries, there being no doubt that the increase is the result of the deposit of fry from the Sandwich hatchery. Some lakes show depletion on account of no deposit of fry, while in others the deposit has been so inadequate as to be of little benefit. The amount of fish caught by Americans in lake Erie has been much greater than the amount caught by Canadians. This is partly due to there being fewer restrictions placed on the Americans, and partly to the fact that Americans have propagated and deposited more fry in their fishing grounds.

In order to understand present conditions and the means for remedying the depletion, I beg to give the following figures taken from the Annual Reports of the Department of Marine and Fisheries. A comparison of the catch of whitefish shows an increased catch out of lake Winnipeg in 1909. The value of the whitefish to the Winnipeg fishermen is only 3c. per lb. All the whitefish that come from lake Winnipeg and

lake Winnipegosis are caught in a lake area of about 4,000 square miles, as compared with 36,000 square miles of Canadian waters in lakes Superior, Huron, Erie, Ontario and Georgian bay. The Manitoba Fisheries Commission, in its recent report, recommended the enlarging of the old and the building of additional hatcheries in Manitoba. The capacity of the three hatcheries now in operation in that province is 300,000,000 whitefish eggs. If the recommendations of the Commission are carried out, it will probably result in one billion eggs being propagated yearly for the waters of Manitoba. In recent years, as few as twenty-five, thirty, forty and less than fifty million whitefish fry have been propagated yearly. This year about seventy-five million have been propagated in the 36,000 square miles of water constituting the Great lakes of Ontario. Seventy-five per cent. of the fry were liberated into lake Erie and Detroit river, which waters in recent years show a steady increase in catch.

The following statement shows the catch of whitefish in lake Winnipeg and tributary waters:

1896	2,871,539 pounds
1899	2,547,041 "
1900	1,974,020 "
1909	3,468,100 "

Contrast the above with the great decrease in the five Great lakes of Ontario.

1890	7,595,692 pounds
1894	4,598,972 "
1899	2,926,035 "
1905	2,895,170 "
1906	3,545,100 "
1908	4,076,643 "

The increased catch of whitefish in the last two years is partly accounted for by the larger catch in lake Erie, which rose from 204,322 lbs. in 1890, to 826,189 lbs. in 1908. The Department of Marine and Fisheries values the whitefish caught in the five Great lakes at 10c. per lb. and the total catch, of all kinds of fish out of said lakes decreased from 33,328,433 lbs. in 1892 to only 22,572,300 lbs. in 1905. Of this decrease about one-half was in the catch of whitefish.

The need of propagation and liberation of fry in the waters of certain localities where the greatest depletion has occurred will be apparent from a comparison of the catch for the several years, out of the various lakes.

On the American side of the lakes, the fishermen do not pay license fees, and there is no limitation to the number of nets used. They prop-

agate a much larger quantity of whitefish fry with the result that they catch more fish. In 1899, the average catch per man on the American side of lake Erie was 7,000 lbs. more than the catch of the Canadian fisherman out of the same lake.

Following is a comparison of amounts taken on the American and Canadian sides of the Great Lake Fisheries:

AMERICAN SIDE		CANADIAN SIDE
1880	68,742,300 lbs.	11,473,000 lbs.
1885	99,842,000 "	27,298,000 "
1889	117,085,568 "	32,169,032 "
1899	113,178,750 "	28,677,691 "
Total, 4 years ..	398,848,118 "	99,617,723 "

The last U. S. Census report for catch of fish in the Great lakes and lake Erie is not available at the time of writing.	1892.....	33,328,433 lbs.
	1902.....	26,912,665 "
	1908.....	27,614,295 "
	1909.....	28,670,361 "

Total for 8 years by Canadians out of the five Great lakes. 216,143,477 "

The following shows the decrease in Canadian whitefish catches in various waters:

LAKE SUPERIOR

1890	978,400 lbs.
1894	991,333 "
1907	300,640 "
Decrease from 1890 to 1907	677,760 "

GEORGIAN BAY AND LAKE HURON

1890	5,940,800 lbs.
1894	2,697,036 "
1905	1,073,030 "
1907	1,162,660 "
Decrease from 1890 to 1907	4,778,140 "

COMMISSION OF CONSERVATION

GEORGIAN BAY

1890	2,966,000 lbs.
1900	818,420 "
1907	293,240 "
Decrease from 1890 to 1907	2,672,760 "

NORTH CHANNEL, LAKE HURON

1890	2,532,800 lbs.
1907	293,240 "
Decrease from 1890 to 1907	2,239,560 "

LAKE HURON PROPER

1890	442,000 lbs.
1907	81,820 "
Decrease from 1890 to 1907	360,180 "

The Sandwich hatchery established in 1876 has, during a period of thirty-five years, liberated only about 1,400,000,000 whitefish fry, most of which have been for Detroit river and lake Erie. A much larger quantity should have been propagated for these waters. That even this amount has been beneficial, may be seen in the increased catch of whitefish in recent years from Detroit river and lake Erie as shown in the following tables:

DETROIT RIVER CATCH OF WHITEFISH

1896	19,500 lbs.
1900	9,126 "
1901	20,721 "
1906	30,800 "
1907	150,000 "
1908	140,000 "
1909	175,000 "
Increase from 1900 to 1909 of	165,874 "

WHITEFISH IN THE GREAT LAKES

LAKE ERIE CATCH OF WHITEFISH

1890	204,332 lbs.
1908	830,189 "
Increase in catch of	625,857 "

If we take the great increase in the catch of fish in the state of Michigan from 33,714,868 lbs. in 1892 to 50,464,000 in 1906, as a criterion, it is probable that the yearly catch by Americans in recent years has been about 130,000,000 lbs. annually, while the Canadian catch in 1905 was only 22,572,300 lbs. and, in 1909, only 28,670,361 lbs. The following statement shows the catch in the waters of lake Michigan, which is about one-third the area of the Great lakes of Ontario, and also the catch in the Canadian Great lakes:

LAKE MICHIGAN		CANADIAN LAKES
1885	27,294,975 lbs.	27,778,100 lbs.
1892	33,714,868 "	33,328,433 "
1905	44,326,000 "	22,572,300 "
1906	50,464,000 "	23,141,830 "
Total 4 years .	155,799,843 "	106,820,663 "

The fishermen of Michigan caught far more whitefish and salmon trout—the best kinds of fish—than the Canadians. The Americans planted several times more whitefish fry in lake Erie than the Canadians.

Following is a comparison of the catch of whitefish in lake Erie:

AMERICAN		CANADIAN
1880	3,333,800 lbs.	205,090 lbs.
1885	3,531,855 "	186,080 "
1889	3,323,772 "	306,213 "
1899	2,066,314 "	431,022 "
Total 4 years .	12,245,741 "	1,128,405 "

The Department of Marine and Fisheries expended for the propagation of British Columbia salmon, and Atlantic salmon more than one thousand dollars per million fry on the average, and these fish are not so valuable per pound as the whitefish in the Great lakes of Ontario, which may be propagated in large hatcheries at a cost of less than \$70 per

million fry. A fact probably not known to the public is that British Columbia salmon live only four years, and deposit their eggs only once during their lifetime, averaging 3,800 eggs to a fish. The whitefish lives fifty to one hundred years and yields 35,000 eggs yearly and is more valuable per pound than the British Columbia salmon.

In conclusion, I would say that much remains to be done under systematic businesslike management to arrest the rapid depletion of the whitefish, our most valuable fish. I have conclusively shown (a) the value of hatcheries, in the comparisons given above between the American and Canadian fisheries, and also between the lakes of Manitoba and Ontario; (b) that the expense of operating small hatcheries is greater in proportion than would be the expense of hatcheries of larger capacity, and, (c) also that there is great need of larger hatcheries run at full capacity. Further, I have indicated where it is absolutely certain that eggs from the finest species of whitefish in Canada can be obtained in great quantities, and that there is an actual need for propagating all fry obtainable. I have no hesitancy in stating that the subordinates of the Department refused to obtain eggs from Detroit River fisheries at one-third the expense per million which they paid at lake Ontario and, in consequence, the hatcheries were often only half filled. In recent years a number of incorrect reports have been given to the Department and this statement can be verified by reference to the Blue Book.

I have also recommended the use of a larger number of pound nets and fewer gill nets. In addition to reasons above given, the loss of fish caught in gill nets during stormy weather is very great. To my own knowledge, 19,500 whitefish have been lost in two lifts of about 80 gill nets at George island, lake Winnipeg. These nets could not be lifted because of stormy weather, and thousands of fish decayed in them.

According to the last two reports of the Department of Marine and Fisheries, Parliament voted \$644,600 for fish breeding, of which the department expended \$370,908, leaving an unexpended balance of \$273,692. I strongly recommend that all money left unexpended be used solely for the purpose of the propagation of whitefish fry for the Great lakes of Ontario, since they are the most valuable commercial fish in Canada.

WHITEFISH AREAS IN THE GREAT LAKES

The accompanying maps of whitefish areas in the Great lakes are reproduced from an article by Paul Reighard, of the University of Michigan, on "A Plan for Promoting the Whitefish Production of the Great Lakes."* In explanation of the maps the author makes the following statements:

"In the accompanying maps we have attempted to indicate the extent of the whitefish areas for each of the Great Lakes. These are the areas within which the fishermen find the whitefish when carrying on commercial fishing operations at other times than during the fall and spring migrations. They are the areas over which it is, or has been, profitable to fish and outside of which the whitefish is found in relatively small numbers. The maps have been made by tracing the appropriate fathom lines on the United States engineer charts of the Great Lakes. They are sufficiently explained in the legends attached to them. In the following table we have given the whitefish areas for each of the Great Lakes together with the extent in square miles of the lakes themselves. These whitefish areas have been obtained by measuring with a planimeter the areas plotted on the maps. The lake areas are taken from H. M. Smith, 1894.

AREA OF EACH OF THE GREAT LAKES, WHITEFISH AREA OF EACH, AND PERCENTAGE OF WHITEFISH AREA

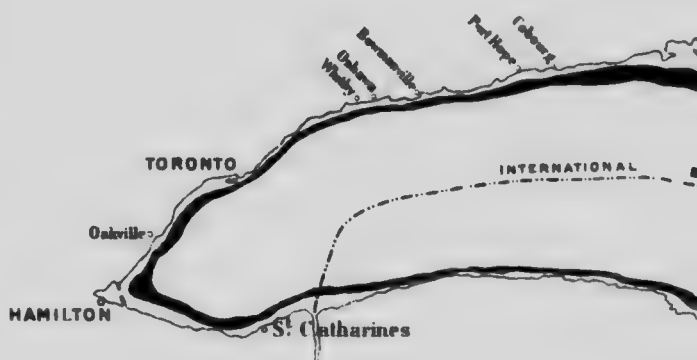
	Total area	Whitefish area	Percentage of Whitefish Area
	Square miles	Square Miles	
Lake Superior.....	32,000	7,400	23
Lake Michigan.....	22,000	2,600	12
Lake Huron.....	21,000	9,400	45
Lake Erie.....	9,500	4,100	43
Lake Ontario.....	6,500	2,200	34
Total.....	91,000	25,700	28

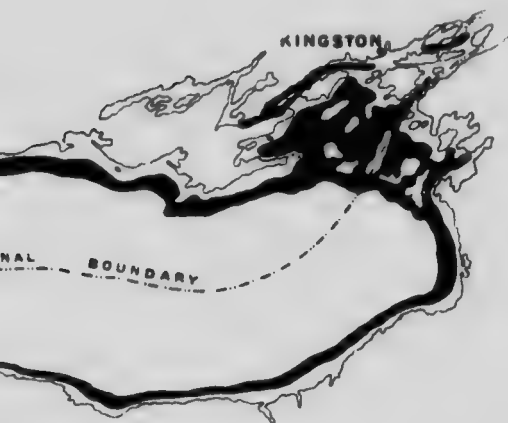
"It is to be noted that the area occupied by the true whitefish is relatively least in Lake Michigan, where it forms but 12 per cent. of the lake area. Lake Erie comes next with a whitefish area 14 per cent. of its total area, if the eastern part of the lake only is taken, but if the western platform of Lake Erie be included over depths of 12 to 30 fathoms, its white-

* Bulletin of the United States Bureau of Fisheries, Vol. XXVIII, p. 645.

fish area is raised to 4,100 square miles, or 43 per cent. of that whole area. Whitefish are taken on those parts of the platform of suitable depth, but in relatively small numbers.

"An examination of the whitefish areas as platted on the accompanying maps tends to strengthen this view of the local habit of the whitefish. In Lakes Superior, Ontario and Michigan we see this area stretching in a relatively narrow zone along the whole shore. This zone incloses a central area of deeper water which separates the whitefish area of one side of the lake from that of the other side and is probably never crossed by these fish. Within it occur the blackfins and longjaws. In Lake Huron we see a similar condition of affairs for the main lake, but in Georgian Bay we find the greater part of the area taken up by whitefish grounds. Here the deep water is not central in the whitefish area but is displaced toward the southwest so as to leave the marginal whitefish area very narrow on one side of the lake and very broad on the other side. In the North Channel of Lake Huron a continuous whitefish area occupies its center uninterrupted by a deeper middle water. In this lake the reef which cuts obliquely across the main lake is said not to harbor whitefish in commercial quantities and not to afford them spawning ground. It is, therefore, not included in the whitefish area, although of suitable depth, and its extent is indicated on the map in outline only."





*Commission of Conservation
Canada*

LAKE ONTARIO

Whitefish area (shown in black) 10-20 fathoms

Scale, 35 miles = 1 inch

(Reproduced from "Plans for promoting the Whitefish Production
of the Great Lakes", in Bull. XXVIII, U. S. Bureau of Fisheries

Commission of Conservation
Canada

LAKE ERIE

Whitelish area (shown in black) 12-30 fathoms

Scale, 35 miles = 1 inch

(Reproduced from "Plans for promoting the Whitelish Production
of the Great Lakes", in Bull. XXVIII. U. S. Bureau of Fisheries









Commission of Conservation
Canada

LAKE SUPERIOR

Whitefish area (shown in black) 10-50 fathoms

Scale, 35 miles = 1 inch

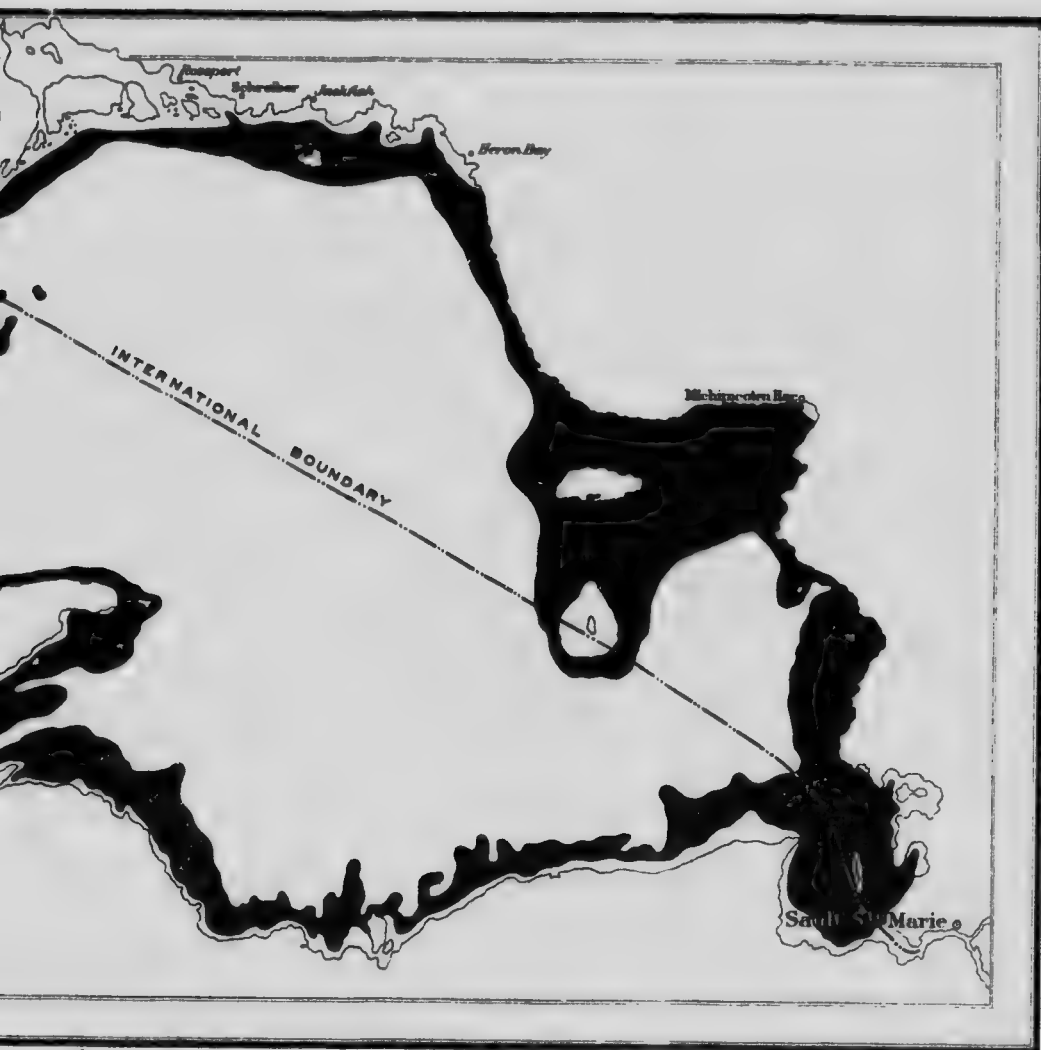
(Reproduced from "Plans for promoting the Whitefish Production
of the Great Lakes", in Bull. XXVIII, U. S. Bureau of Fisheries

Port Arthur
Fort William

Lake Royale

Duluth





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FISH CULTURE IN CANADA

During the past year 1,024,282,000 fry were planted in Canadian waters by the Dominion fish hatcheries. Some idea of the extension of this work may be had if we remember that the number of fry planted in 1905 was 627,541,000, while in 1900 it amounted to only 265,941,000. Notwithstanding the enormous output of our hatcheries in 1909, we cannot yet rival the production of those of the United States, which, in that year, planted 3,107,131,910 fry.

FRY PRODUCED BY DOMINION GOVERNMENT HATCHERIES

(000 omitted)

1868-73	1,070
1874	510
1875	1,570
1876	9,655
1877	13,451
1878	27,042
1879	21,684
1880	21,013
1881	22,949
1882	55,799
1883	83,784
1884	53,143
1885	81,067
1886	76,714
1887	79,273
1888	88,109
1889	47,699
1890	90,212
1891	115,772
1892	135,959
1893	258,314
1894	254,919
1895	294,040
1896	202,459
1897	150,859
1898	192,477
1899	222,350

COMMISSION OF CONSERVATION

1900	271,996
1901	203,540
1902	271,301
1903	314,576
1904	473,258
1905	627,541
1906	657,925
1907	813,979
1908	682,545
1909	1,024,282

The number of hatcheries in operation, of course, shows a corresponding increase. In 1900, there were 12, in 1905, 28, and last year the number was 37. In other words, the number of hatcheries in ten years has increased by nearly 210 per cent., and the output by about 276 per cent.

The government fish and lobster hatcheries are located throughout the Dominion as follows:

- (a) Nova Scotia: Bedford, Windsor, Margaree, Bay View, Canso.
- (b) New Brunswick: Restigouche, Miramichi, Grand Falls, Shipigan, Shemogue.
- (c) Prince Edward Island: Kelly pond, Charlottetown, Georgetown.
- (d) Quebec: Magog, lac Tremblant, Tadoussac, Gaspé, lake Lester, St. Alexis.
- (e) Ontario: Ottawa, Newcastle, Sandwich, Warton, Sarnia.
- (f) Manitoba: Selkirk, Berens river.
- (g) British Columbia: Graute creek, Skeena river, Harrison lake, Pemberton, Rivers inlet, Babine, Stuart lake, Nimpkish.

The total expenditure in 1909 on fish culture in Canada was \$180,345. The amount voted for this purpose was \$322,300; so that approximately 56 per cent. of the authorized amount was expended. The expenditure for each province, and the number of hatcheries in each, was as follows:*

	EXPENDITURE	NO. OF HATCHERIES
Nova Scotia	* 15,722.....	5
New Brunswick	21,102.....	5
Prince Edward Island	8,130.....	3
Quebec	19,292.....	8
Ontario	22,614.....	5
Manitoba	14,386.....	3
British Columbia	66,847.....	8
General Account	12,240	

* Cents omitted.

FISHERIES OF PRINCE EDWARD ISLAND

By E. T. CARBONELL

Secretary of the Fish and Game Protection Association, and Game Inspector of Prince Edward Island

Although the area of Prince Edward Island is comparatively small, the income derived from fish and game, when considered in connection with the area, exceeds that of most of the other provinces of the Dominion. Still, the present value of the fish and game to the Province is but a fractional part of that which it most assuredly would be if proper conservation measures were adopted.

The province of Prince Edward Island has an ocean-lapped shore of about three hundred and eighty miles, intersected by numerous bays, and marsh-bordered creeks and tidal rivers. It is studded with both fresh-water and salt-water ponds and numerous small lakes. These natural advantages make it not only the ideal habitation for many species of food fish and resident game birds, but also the most attractive resting place and feeding ground for wild geese, brant and other migratory game birds on their northern and southern flights.

Unfortunately for the Province, neither the food fish, the game fish nor the game birds are as plentiful as they were thirty or forty years ago, owing, doubtless, to the suicidal policy which has been followed, of catching and killing all that was possible in any manner and at any time opportunity offered. The food fish and crustacea are becoming scarcer each succeeding year. Last year the output showed a decrease in value of \$181,067.56 from the previous year. On the other hand, the game fish and game birds during the past five years have shown a great increase in numbers in consequence of the increased measure of protection they have received during those years. This is a strong argument in favour of the conservation of all fish and game.

Game Fish

Salmon The industry of salmon fishing is but little attended to in this Province, the catch last year being less than 5,000 pounds. There is a hatchery at Kelly pond maintained at a cost of nearly \$2,000 a year, from which hundreds of thousands of salmon fry are distributed among the various rivers. Last season over one million were so placed. Every fall the rivers of the Province are invaded with vast numbers of salmon, which go up the rivers to spawn. These are the genuine *salmo salar*, which return to the salt water after spawning.

and do not then die immediately, as is the case with the salmon on the Pacific coast. Unfortunately, but very few salmon are tempted to enter the inland waters during the open season when their flesh is good for food; for there are no spring-water rivers on the Island which they can possibly reach to clean themselves, as in New Brunswick and Nova Scotia. The only salmon taken, therefore, are those captured in nets at the exposed headlands, with the exception of the few spent fish which are taken in the spring of the year in the Morell river while on their way to the salt water. These fish readily take either the fly or bait, but are unfit for food. Owing to the natural conditions, nothing can be done to render this industry of any great value. It is very doubtful if even the placing of fishways in the dams would be of much value so far as the salmon fishery is concerned.

Trout During the summer months the tidal rivers of the Province are inhabited by great numbers of the beautiful Greenland trout (Canada salt-water trout). These fish offer every possible inducement to the angler, as they are numerous and gamey, while their flesh, which is a bright reddish pink, is a great delicacy. They vary in weight from half a pound to three pounds each. During the last five years they have been fairly well protected, and, in consequence, they have vastly increased in numbers in spite of the large catches that have been made. The mill-ponds of the Island and the streams above the dams on the rivers are filled with the offspring of the Greenland trout which were imprisoned when the dams were erected. These fish, being prevented by the dams from making their annual pilgrimages to the sea, have deteriorated so much as to have become of little or no value, either as a game fish or as an article of food. Not only have their gamey characteristics been lost, but their bodies have become soft and slimy. Their flesh, having lost its firmness and bright pink colour, has become flabby and of a dirty white hue, with no trace of the original delicate taste. An efficient fishway erected in every dam would permit these fish to make their needed trips to the sea and in one season they would recuperate and thus again become of value.

The streams above the dams require to be stocked with the fry of brook trout, or other fresh-water fish, and, if the hatchery at Kelly pond were to be devoted to the hatching and distributing of such fish, it would be doing a much more valuable work than it does now in hatching salmon from which the Island receives little or no benefit.

The dates at which the sea trout make their appearance in the under-mentioned harbours, or begin to ascend the rivers named below are approximately as follows:

Charlottetown harbour	 May 24th.
Rustico harbour	 May 15th.

FISHERIES OF PRINCE EDWARD ISLAND

17

New London harbour	May 1st.
Souris harbour	First spring tides in May
Corran Ban	May 5th.
Summerside harbour	First spring tides in May.
Dunk river	June 1st.
East and West rivers	June 26th.
Fortune river and Rollo bay	First spring tides in May.
Winter river	July 12th
North river	June 26th
Wheatley river	June 15th
Belle river	June 1st
Souris river	June 1st
Pierre Jacques river	June 10th
Johnson river	Aug. 1st.

Food Fish

Cod

For some reason cod fishing is not now being as vigorously prosecuted as it was a few years ago, a trifle less than 2,464,000 lbs. having been taken last season. Happily the dogfish, those scourges which have caused so many fishermen to retire from the industry in disgust, are either moving away to other quarters or, for some other reason, decreasing in numbers. This decrease is claimed by some to be due to the vast increase in numbers of the fish-eating birds which prey on the young dogfish. These birds have been protected around the coasts for several years. It is to be hoped that, with the disappearance of the dogfish plague, many former cod fishermen may be encouraged to again engage in the industry.

Haddock

Haddock fishing, like cod fishing, has not been prosecuted with as much vigour as formerly, fishermen having become discouraged by the dogfish. The haddock catch last year amounted to 134,736 lbs. of dried fish and 43,400 lbs. of fresh. The disappearance of the dogfish will again induce men to engage in this industry.

Hake

Hake fishing continues to hold its own. The catch last season was nearly up to the average of 1,200,000 lbs. a year. The slight decrease in the catch from that of the previous year was owing to the exceedingly stormy season and the consequent danger of staying out on the fishing grounds during the night time in the very small craft which the fishermen use.

Herring

The herring fishery industry appears to be on the increase. There was, however, a shortage last year in Kings county, but it was more than made up by the increased catch in Queens and

P. me. counti The total catch last season was 12,000 bbls. salted herring, 30,000 lbs. which were disposed of fresh or smoked, and many thousands of barrels which were used for bait.

Mackerel The catch of mackerel last year amounted to 1,338 bbls. salted, which realized \$15 per bbl., and 40,400 lbs. fresh, which were disposed of at 12 cents per pound. Experience tends to show that on whatever coast lobster fishing is vigorously carried on, mackerel become correspondingly scarce.

Smelts The smelt fishing industry in this Province is in a thriving condition. Smelt nets to the number of 1,145, valued at \$10,115, were in use last season, and the catch amounted to 857,550 lbs., which realized \$51,453. These fish were, for the most part, shipped in a frozen state to either Boston or New York. Profitable as this industry is at the present time, it is unreasonable to expect it to continue so for any great number of years unless some measures are adopted to ensure the returning to the water, while they are yet alive, of all the undersized fish taken in the bag nets. When a big haul is made, it frequently happens that all the small fish are dead before the culling of the take is completed, and the unsaleable fish are shovelled back into the water.

Alewives The alewives, or gaspereaux fishery, is by no means as vigorously prosecuted as it might be, the catch last year amounting to only 500 bbls., which sold at the rate of \$4 per barrel. The inland waters of this Province actually teem with these fish at certain seasons of the year.

Crustacea

Lobsters Prince Edward Island is particularly adapted to the industry of lobster fishing. Lobsters can be found everywhere along the coasts of the Island, and the coast line is indented with innumerable small bays and creeks which form good harbours for the boats engaged in this industry. The industry is of such great importance that it should not be allowed to die out for the want of proper conservation.

There are in the Province, at the present time, 187 canneries, valued at \$145,818, in which 2,429 men are employed. To supply these canneries 350,505 traps, valued at \$240,474, were set out last season. The pack for the season amounted to 2,255,898 lbs., and, in addition, 1,850 cwt. were disposed of fresh in the shell. The lobsters packed, however, were, for the most part, very small in size. The practice of canning such small lobsters, if permitted to continue, must of necessity prove fatal to the lobster packing industry. If this industry is to be perpetuated

all the traps used must be fashioned so as to prevent the small lobsters from being caught. The fishermen are usually indifferent as to what becomes of the small lobsters taken in the traps, as they are very destructive to the bait. A size limit never saved the lives of many lobsters: traps must be so formed that either the small lobsters cannot enter them, or else be made sufficiently small so that the small lobsters cannot be retained therein. The present system of killing so many small lobsters to fill a single can, when, in one can, those same lobsters would fill three or four cans, is detrimental alike to the interests of the packers, the fishermen and the industry.

The Dominion Government is operating two lobster hatcheries on the Island: one at the entrance of Charlottetown harbour, and the other at Georgetown. These two hatcheries cost \$6,453 last year for maintenance, but from them 148,000,000 young lobsters were returned to the waters from which the eggs were taken. Under the former system all these lobsters would have been lost. This is doing much to perpetuate the industry, but if these small lobsters are allowed to be killed before they arrive at maturity, the results will be largely nullified.

Oysters That the quality of the Prince Edward Island oyster is excellent is universally acknowledged: the Malpeque oysters which grow on the natural beds in Malpeque bay are especially noted and prized throughout the continent. In the past, the natural oyster beds have been constantly fished, regardless of seasons or regulations, and, as a natural consequence, they have become rapidly depleted, some beds being entirely exhausted and others only yielding pecks where thirty years ago they yielded barrels. The output from the natural beds last year amounted to 13,519 bbls., which sold on an average at \$7 per barrel.

There are, at the present time, about 4,300 acres of producing natural oyster beds in Prince Edward Island, but this is only a fraction of the area that could be made productive if artificial oyster culture were carried on as it is in the United States and in Europe. This would require the expenditure of considerable capital and industry, but that it would be a very profitable expenditure is beyond cavil, as the conditions are extremely favourable for oyster culture on practically the whole coast of the Island.

Quahaugs Last season 12,378 bags of quahaugs were taken, and they were sold for \$24,756. This was a slight increase over the catch of the previous year. The increase was due to the fact that a much larger number of men were engaged in the fishery, the catch per man being far short of that of the previous year. At the rapid rate of depletion of the quahaug beds, the time cannot be far distant when all quahaug fishing in this Province will be at an end.

Clams Although clams are very plentiful and of a good size, as well as of a splendid quality, but little attention is paid to them, the total output last year being only 410 bbls., which sold for \$4 per barrel, and 300 cases of canned clams, which brought \$4 per case. The supply appears to be almost inexhaustible.

License Fees Every lobster packer and all persons engaged in fishing for quahaugs, oysters or smelts, as well as all non-residents angling for trout, are required to take out licenses before they commence fishing. For these the following fees are required:

Lobster packers: \$5 for first hundred cases packed and \$2 for each succeeding hundred cases.

Quahaug fishermen: \$1 each.

Oyster fishermen: 50 cents each man.

Smelt fishermen using gill-nets: One cent for every fathom of net used.

Smelt fishermen using bag-nets: \$2 per net.

Non-residents angling for trout: Foreigners \$5, British subjects \$2.

Open Seasons Quahaugs: From May 1st to June 30th and Sept. 1st to Sept. 30th.

Oysters: From October 1st until the ice forms over the rivers.

Smelts: With gill-nets, from Oct. 15th to Feb. 15th.

Smelts: With bag-nets, from Dec. 1st to Feb. 15th.

Lobsters: Queens and Kings counties, April 26th to July 10th.

Part of Prince County, from May 25th to August 10th.

Trout: From April 1st to September 30th. See sec. 26 of the Act.

The Warden System The warden system, as at the present time sustained by the Dominion Government for the conservation of the fisheries of the Province, costs that Government about \$10,000 a year. The staff of fishery officers consists of an inspector, four overseers and about seventy wardens. This system, in so far as the fisheries of Prince Edward Island are concerned, has outlived its usefulness and should be replaced by one that is more efficient.

The amount of money being now annually expended in supporting the warden system, if judiciously used, would be sufficient to effectually put a stop to all fishing at illegal seasons and by unlawful means. A clerk in the fishery office to keep the statistics and receive information, together with a force of six detectives under the supervision of a strenuous officer, similar to the Mounted Police of the North West, could easily be supported by the sum now expended; and their efforts, if judiciously directed, would not only do the work that the wardens have failed to do, but would cause Prince Edward Island to become the ideal summer resort for foreign anglers.

FISHERIES OF MANITOBA

On March 16, 1909, a Commission was appointed by the Dominion Government to investigate the fisheries of Manitoba. Complaints had been made that the existing regulations applying to the Western Provinces, were out of date and unsuited to present conditions. These regulations, in fact, applied to all of Manitoba, Saskatchewan, Alberta and the North West Territories, and one of the important tasks of the Commission was to recommend that a separate set of regulations should be put in force, applying only to Manitoba and Keewatin waters.

The Commission, as finally constituted, consisted of Prof. E. E. Prince, chairman, J. B. Hugg, and D. F. Reid. The principal recommendations made are here quoted without any opinion being ventured as to their justness or accuracy.

In their report the Commissioners state that:

Licensing System

"The one marked abuse in connection with the regulations which have for over twenty years been in force, has been that, while a distinction was drawn between commercial licenses and domestic licenses, there actually existed no such distinction in practice. Domestic licenses have been constantly used for commercial purposes, and it has been a matter of common criticism that the idea of the domestic license has never been carried out at all. In our present recommendations we meet this difficulty by abolishing the commercial and domestic license and by providing for fishing licenses only, apart from the settler's permit for fishing for his own use.

"It has appeared to us necessary to provide for only one type of fishing license, namely, the license to be used by the genuine fisherman, one license for summer fishing and another license for winter fishing and, instead of the domestic license to be used for food purposes, it has appeared to us that the issue of a settler's permit would amply suffice. Under this permit any settler or Indian can fish at any time for his own domestic needs.

"Inasmuch as tugs are absolutely necessary on the lakes, we have provided for a special tug license, which will enable these vessels to do limited fishing. Otherwise there was the possibility that steam tugs would not be operated in towing boats of the fishermen, an important accommodation, unless such tugs had some fishing privilege accorded them. As a matter of fact, this commission has abolished the Commercial Company's license altogether, the object being to remove all control by commercial companies or combines, and to place the fisheries, as far as possible, in the hands of the *bona fide* fishermen."

Hitherto the method of issuing licenses has been exceedingly cumbersome, and has led to great laxity in the enforcement of the fishery

regulations. Concerning this matter, the Commissioners reported as follows:

"Apart from the question of insufficient supervision and control of fishery operations, there is one point of considerable importance respecting the matter of issuing licenses which we think has had a good deal to do with the laxity on the part of the fishermen and the fishing firms in the observance of the regulations. The method of issuing licenses requires to be greatly improved. We find that it is the rule for all licenses to be made out and issued by the department in Ottawa. The method is as follows: Applications are sent in by the fishermen to the Inspector of Fisheries in the province, who enters them on official forms and forwards them to Ottawa with his remarks and recommendations and with the requisite fee. For effective supervision of the fishing operations, the license should be issued immediately, so that it may be in the hands of the fisherman before he begins to fish. But this we find is never done, and, under the present cumbersome and roundabout system, the fisherman, as a rule, goes to the fishing grounds, carries on his fishing operations for several months, and, on his return from the fishing grounds, may then possibly receive his license, though we have found that as long a period as five or six months may elapse after the fishing is all over, before his license reaches him. Thus, his license which is his authority for commencing to fish and for carrying on fishery operations, is never in his possession until long after the fishing is completed. This very lax method has a tendency to render the license, and the conditions attached to it, unimportant in the eyes of the fisherman. He goes to the fishing-ground before he has received his license, and not knowing whether he will receive a license at all. He has no means of becoming acquainted with the fishery regulations which are printed on the back of the license, and there is no doubt that a large number of the fishermen never see the conditions of the license until long after the fishing is started. The present system calls for a radical change, but, in addition to the serious laxity arising from the non-issue of the licenses, there is an absolute necessity for the re-organization or for the modification of the official fishery staff in the province if any effective improvement in the observance and enforcement of the law is to be accomplished."

Supply of Whitefish For many years, there have been constant complaints that Manitoba waters were being over-fished, and that there was real danger that the whitefish industry, especially, was being seriously affected. Concerning these reports the Fisheries Commissioners speak as follows:

"The Commission, in reviewing the reports and records of the Manitoba fisheries for over thirty years, has been struck by the continual recurrence of the complaint that the lake Winnipeg and Manitoba waters were being over-fished, and that the total depletion of the fisheries was threatened. These fears have happily never been realized, and it is a proof of the wonderful productivity of lake Winnipeg and the Manitoba waters that, in spite of the abuses to which we have referred, and in spite of the over-fishing, the yield of fish

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FISH PRODUCTION

Figures in

	1892	1893	1894	1895	1896	1897	1898	1899	1900
Whitefish.	4,354,013	4,530,255	3,416,698	4,270,319	4,573,660	3,363,863	3,361,141	3,523,520	5,872,400
Trout							10,000	10,000	
Pickereel	592,593	600,371	1,261,050	931,190	1,418,870	1,343,048	1,357,422	1,195,758	2,275,100
Pike	433,895	573,060	749,586	689,395	934,995	639,973	593,278	2,021,258	444,300
Sturgeon	93,090	37,200	76,270	104,240	175,745	225,619	447,510	444,787	981,500
Caviare.							8,520	15,745	17,500
Perch			18,434	29,450	50,800	56,737	75,790	71,013	48,000
Tullibee	161,800	53,600	378,324	278,800	309,564	359,410	303,620	239,948	204,200
Catfish		10,150	59,738	79,724	178,000	92,664	164,363	124,653	144,400
Coarse Fish	1,496,200	1,118,150	1,685,110	858,700	1,671,800	827,200	1,965,130	1,884,100	241,400
Gold-eyes.								25,881	7,200
Bas ^a					16,000				
Consumed at home and not enumerated.		1,363,515	2,620,845	1,928,230	1,894,850 ^c	817,100	952,100	572,500	48,800
Total.	7,131,591	8,286,301	10,266,055	9,170,048	11,224,293	7,727,614	9,238,874	10,129,163	10,744,800

^a Where blanks occur no figures were given in the Fisheries Reports.

^b The figures given for 1905 to 1909, inclusive, refer to both Manitoba and Keewatin.

^c The figures for 1907 are taken from p. 205, Fisheries Report for 1907-8. On p. 203 of the same Report where the production for the year is again given, different figures are given.

DUCTION OF MANITOBA, 1892-1909 *

Figures given in pounds)

1900	1901	1902	1903	1904	1905b	1906	1907c	1908	1909	
5,872,400	7,207,600	7,911,500	9,100,000	9,400,000	8,005,000	6,136,000	3,895,000	3,219,000	4,662,100	Whitefish
.....	.....	.....	.....	.....	.....	46,000	100,000	15,200	4,500	Trout
2,275,100	4,533,700	5,879,600	6,900,000	7,250,000	6,900,000	6,161,000	3,995,000	2,936,000	5,750,400	Pickereel
144,300	3,050,300	3,184,800	3,840,000	4,285,000	3,790,000	2,825,000	2,321,000	2,207,000	3,067,100	Pike
981,500	600,000	600,000	600,000	600,000	600,000	325,000	177,000	87,500	94,300	Sturgeon
17,500	20,000	30,000	25,000	35,000	36,000	37,000	17,500	12,800	3,600	Caviare
48,000	28,500	40,000	1,000,000	140,000	144,000	89,000	82,000	44,600	64,800	Perch
204,200	802,000	811,500	1,562,000	2,068,000	2,074,000	1,706,000	1,380,000	477,000	834,200	Tullibee
184,400	550,000	600,000	500,000	550,000	500,000	200,000	175,000	201,700	87,200	Catfish
241,400	5,022,000	7,050,000	7,100,000	6,765,000	6,250,000	4,840,000	2,600,000	791,000	1,317,600	Coarse Fish
7,200	200,000	300,000	400,000	311,000	311,000	557,000	506,000	635,000	959,200	Gold-eyes
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Bass
48,800	738,600	1,011,800	1,180,000	1,510,000	1,570,000	1,725,000	1,665,000	887,000	3,614,200	Consumed at Home Not enumerated
10,704,800	22,752,700	27,422,200	32,207,000	32,914,000	30,180,000	24,647,000	16,713,500	11,513,800	20,459,200	Total

, different figures are stated for Coarse Fish and Gold-eyes, from those here quoted.

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FISHERIES OF MANITOBA

has marvellously kept up, and that, notwithstanding a prevalent feeling of uneasiness in regard to the present condition of these waters, with the restrictive regulations which we now recommend there is, in our opinion, no fear of the exhaustion of these fisheries in the immediate future.*

ANNUAL CATCHES ON LAKE WINNIPEG AND SUGGESTED LIMITATION

"We have taken special pains to ascertain with as much accuracy as possible, the total annual summer catches of whitefish in recent years. The difficulty of collating from the official published reports accurate totals of the catches in different years has been great, owing to the lack of uniformity in the statistics, and the inclusion of winter-caught and fall-caught fish. These, and other confusing methods, however, we have elsewhere referred to. The following figures we believe to be as accurate as it is possible for such fishery returns to be.

SUMMER-CAUGHT WHITEFISH—LAKE WINNIPEG

	In the round
1904	5,244,194 lbs.
1905	3,780,188 "
1906	3,565,908 "
1907	1,272,000 "
1908	2,335,000 "
1909	2,162,298 "
1910	2,469,845 "

"The total catch specified in the regulations for 1910 required that not more than 2,400,000 lbs. of whitefish should be taken; but the last lifts of fish, just before the season legally closed were far heavier than the most experienced men could have foreseen. As a matter of fact, during the last few days of the season, a reduced amount of net was placed in the water in order to avoid any excess in the catch over the specified legal quantity, but the total catch was as stated above. There was also an undoubted misunderstanding in regard to the total catch as defined in sub-section 4 of section 12 of the regulations, dated April 18, 1910, which was regarded as applying to whitefish 'in the round,' whereas on the lake it was generally understood by the fishermen and the fish buyers that the total quantity specified was to apply to 'dressed' fish. In the recommendations we make in the present report, the limit we specify is for 'dressed' whitefish. It is generally held by practical men in the fish business that the difference between the 'dressed' fish and fish in the 'round' is about one-eighth of the total weight.

"Considerable dissatisfaction arose from the fact that in the order in council the expression 'In the round' was used, which, of course, considerably reduced the total amount of fish, and the pro-

* In 1904, in the period of unrestricted fishing, the catch of summer-caught white-fish in the round in lake Winnipeg, was 5,244,194 lbs. as given above; while in 1909, the last year of the unrestricted fishing period, it was 2,162,298 lbs.

portions which, by arrangement, each company was prepared to handle. From the information which has been placed before there is strong reason to believe that the limit of 2,400,000 pounds was not originally intended to refer to 'round' fish, but to 'dressed' fish, and our recommendation would, therefore, be, that a maximum limit of the summer catch be provided, but that it be placed at 2,500,000 pounds of whitefish in a dressed condition."

**Summer
Fishing**

There has been much difference of opinion as to the advisability of permitting the continuance of summer fishing in the Manitoba lakes. It has been asserted that twenty-five per cent. of the summer-caught fish were lost owing to storms preventing overhauling of the nets regularly, and the fish being left in the mesh until they died and polluted the lakes. The Commissioners treat this question in some length. They say:

"To the main portion of the interim report, unanimously agreed to by the commission as a whole, there were added two majority reports, each bearing the signatures of two members of the commission—one report distinguished as addendum A (page 11 of the interim report) which urged that lake Winnipeg had reached such a serious condition in the opinion of the majority that the total closure of the lake to all summer fishing was justifiable, commencing from the present year 1911, such closure to continue until evidence was forthcoming that the fishery resources of the waters named had recovered in a measure their former plentitude. This recommendation for closing lake Winnipeg was adopted by the department, and would have come into force during the present year, 1911, in the ordinary course of events. By order in council, dated April 18, 1911, sec. 12, sub-sec. 9, it is provided that—'after the year 1910, commercial summer fishing shall be prohibited in lake Winnipeg.'"

"The second majority report, distinguished as addendum B (page 12 of the interim report), suggests that there should be a limit imposed on the annual catch of whitefish taken during the summer season, June 1 to August 15, and this recommendation of two of the three of the commissioners was adopted by the department commencing with the summer fishing operations of 1910. By order in council above named, sec. 12, sub-sec. 9, it was provided that—'During the summer commercial season of 1910, not more than two million four hundred thousand (2,400,000) pounds in the round of whitefish shall be taken. As soon as such quantity is caught, the Inspector of Fisheries shall order all nets to be taken out of the water.'"

"With respect to the closing of lake Winnipeg, we feel bound to call attention to the important fact, that evidence of the decline of the fishery resources of lake Winnipeg to the serious extent generally alleged has not been amply borne out by our subsequent investigations, but that, in spite of the excessive fishing, or overfishing, as has been alleged, the supply of whitefish in lake Winnipeg is still enormous and gives no sufficient ground for serious fear for the future. The sub-committee which visited the fishing grounds after the end of the summer fishing operations, and personally t

FISHERIES OF MANITOBA

special localities which had been abandoned because of the supposed total depletion of fish, found evidence by setting nets that the depletion was far less serious than had been alleged, and that the means taken for thoroughly investigating the state of these grounds established this remarkable result, that the fears anticipated by many were not realized and that the areas referred to did not show signs of the danger of immediate exhaustion. It is true that the size of the fish appeared to have decreased somewhat, but the quantity of whitefish abounding in these areas had not decreased to the extent that had been commonly claimed. We do not think, therefore, that, in view of this evidence, and in view of the facts ascertained, the continuance of the prohibition of summer fishing is justifiable; and we strongly recommend, therefore, that the first part of sub-section 9 of section 12 of the order in council of April 18, 1910, be rescinded. To close down summer fishing operations in any case would be a most serious step and have far reaching consequences on the industries of the province. And this important fact must be borne in mind, that lake Winnipeg is the only source of supply for fresh whitefish on which the western Canadian and other markets in the Dominion can depend, and the closing down of summer fishing would therefore deprive a large part of our population of any supply of fresh whitefish during the summer season. The summer fishing is carried on in a part of this great lake the shores of which are almost entirely without population and not likely to be settled for a considerable time on account of the special nature of the country and its not being adapted for agricultural purposes. The somewhat satisfactory signs which our further investigations have shown as to the state of the fish supply in the northern portion of lake Winnipeg, would not justify, in our opinion, the industrial dislocation to which we refer, viz.: the stoppage of an important fishery enterprise, and the cutting off of a valued and necessary supply of fresh fish for our own local needs in the west and for eastern markets."

Whitefish Size Limit

That something should be done to increase the size of the whitefish caught was recognized by the Commissioners, who state that they are convinced that a minimum size limit for the more important food fishes is absolutely necessary. To quote:

"We, therefore, recommend that certain sizes of fish should be specified in the regulations, below which no fish can be legally captured. We also recommend that the legal mesh of the various nets should be increased. An increase in the size of the mesh of nets means, of course, that quantities of net now legally in use would become useless unless sufficient notice of a change were given and time allowed for wearing out the present nets and for obtaining a supply of new nets of larger mesh. We, therefore, in our present recommendations, have adopted the plan of gradually increasing the size of mesh with a sufficient interval of time to allow the fishermen to provide themselves with nets in accordance with the proposed new regulations. We cannot resist the conclusion that by gradually increasing the mesh in this way less hardship will be felt by the fishermen and the fish firms and the average size of fish taken will, of

COMMISSION OF CONSERVATION

necessity, be improved. The question has been discussed at great length by the Commission as to the minimum size of whitefish which matures or produces eggs. The view has been widely expressed that a large quantity of the whitefish taken in the waters of Manitoba, say two pounds or under, have not reached maturity and have never had the chance to spawn. Of course, if vast quantities of fish are captured before they had had a chance to spawn, the result must be serious for the future of the fisheries, and, whatever the facts may be, it seems desirable to increase the average size of fish taken so that the majority of the fish shall have a chance of depositing their eggs or of reaching a mature condition, when their eggs can be utilized for hatchery purposes.

"During the present winter the fact was called to the attention of the Commission that several carloads of whitefish, caught in the waters at the north end of lake Manitoba, were found by the buyer after purchase, to be fish of such small average size, that it was necessary to hold them back until catches of larger size fish could be secured to mix with them before exporting the whole. In this way alone was it possible to raise the average of the shipment to a marketable size. These small whitefish, it is well known to the fishermen, are really a drug in the market, there is so little demand for them. There is practically no sale for such under-sized fish, not exceeding two pounds in weight and a large quantity of such whitefish, caught during the preceding winter (1909-10) are, the Commission is aware, still held in cold storage at Winnipeg because there has been found to be no sale for them. There appears to be no way of effectually stopping this capture of whitefish, immature and of small size, so long as pickerel or dore nets, of a mesh so small as $4\frac{1}{4}$ or $4\frac{1}{2}$ -inch extension measure, are used on grounds frequented by whitefish.

"We are convinced that it will be absolutely necessary to require the use of nets of not less than $5\frac{1}{4}$ -inch extension measure such a destruction of small whitefish as that we refer to is found to continue. It would, in our opinion, be the duty of the Inspector of Fisheries to see if the abuse we refer to ceases and if the capture of small whitefish continues, in the way we have described, the Department should on the report of the Inspector refuse to sanction the issue of licenses for nets of less mesh than $5\frac{1}{4}$ -inch extension measure, on grounds known to be the resort of whitefish. Such meshed nets should not be permitted on any area in the lakes of the province where there is a certainty of whitefish being captured in any considerable quantities.

"The evidence as to the existence of whitefish grounds and pickerel grounds, that is, of areas where either of these fish predominated during the various fishing seasons, was somewhat contradictory, and the Commission had great difficulty in deciding whether or not any areas of large extent, or defined by fairly definite boundaries, could be distinguished and regarded as whitefish grounds, or, on the other hand as pickerel grounds. Fishermen of large experience assured the Commission, in their evidence, that such grounds could be distinguished, while other witnesses stated that both fish occurred on the various fishing grounds and no distinct areas could be separated.

in the way claimed by other witnesses. The only feasible course appears to be to rely upon the opinion of the Inspector of Fisheries. He could readily ascertain before recommending licenses if it was safe to allow small-meshed pickerel nets or refuse them, and in this way reduce, or entirely put an end to, the destruction and shipment of small under-sized whitefish for which there is no demand."

Concerning the sturgeon fisheries the Commissioners have this to say:

"In our interim report of November 26, 1909, page 10, we recommended that the export from the province of Manitoba of sturgeon and of caviare, which is the prepared and cured roe of the sturgeon, be prohibited on and after January 1, 1910. Four reasons had weight with us in making this recommendation, namely: (1) the undoubted decline in the supply of sturgeon in the lakes and rivers of the province. This decline is much greater than the published statistics indicate; and, indeed, the returns during the last four or five years have not indicated catches of sturgeon in Manitoba waters proper, but have included large takes of sturgeon in the Nelson river and in the northern waters in Keewatin, never before commercially exploited. (2) Sturgeon have always been a staple article of food with Indians, and in past years the Department has laid stress on the importance of this fish as a source of sustenance for the Indian tribes, especially the northern tribes. (3) The increased value and the increased demand, especially in foreign markets, for caviare and smoked sturgeon; and the greatly increased prices consequent on this growing demand has stimulated a desire on the part of fish firms to make large catches of sturgeon. Wherever sturgeon occur in Canada, there has been, in recent years, every effort made to capture them, and, it must be added, to exterminate them. (4) The action of the International Fisheries Commission, which, in the code of regulations prepared by them, provide that sturgeon fishing should be stopped for four years, is of weight in this connection.

The following is a summary of the principal limitations on fishing suggested by the Commissioners, for Manitoba waters:

- (1) A considerable decrease in the amount of net and gear to be used by the fishing tugs;
- (2) The limitation of the total annual summer catch of whitefish;
- (3) The delimitation of the area to be commercially fished in summer;
- (4) A strict observance of the shortened fishing season; and
- (5) Confining the main fishing operations strictly to fishermen residing in the Province.

Again, owing to the many representations made by fishermen to the Commissioners, they recommended that fall fishing from September 1st to October 15th be also allowed in the southern portion of lake Winnipeg (see pp. 20 and 21 of their Report), as it is alleged that winter fishing can not be carried on there to any extent. It was also claimed that fisher-

men had gone to a great deal of expense in erecting ice houses and for the purpose of caring for this fall catch, and therefore the prohibition of fall fishing would work a good deal of hardship. In connection with this matter, however, it has been suggested that fall fishing should not be permitted on recognized whitefish grounds, that no more than 1,000 yards of four-inch extension measure of gill net be set, and that skiffs only should be used by the fishermen, and that a license for skiffs should be levied.

**Foreign
Fish
Companies**

The Commissioners state that, until about five years ago, American companies had been controlling the marketing of Manitoba fish. These companies, it was asserted, exported the best fish and sold the poorer grades in the local markets. A commercial crisis in the Western States, however, led these American companies to sell their Canadian plants, which then passed into the hands of Canadians. This should have meant at least, that the better fish would have gone their way to the Canadian markets at lower prices than had formerly been possible for the poorer grades. But no such result has followed.

"While the United States companies now are simply the purchasers of our catches of Canadian fish, they are such heavy purchasers, having contracts with Canadian companies whereby a regular supply of fish in accordance with the requirements of the business is secured, that entire freedom from the control of the firms on the other side of the boundary line is well nigh impossible. The high price of fish which the Canadian consumer complains of arises, it must be admitted, from the methods of the middlemen who act as a medium between the fish companies and the small retail dealers. The evidence secured in Winnipeg showed that the middleman may make as much as three cents per pound profit on his fish, whereas the fisherman himself receives on the lake not more than three cents per pound for his fish, and the Canadian companies handle the fish and store them in their freezers, or ship them on ice, do all this work on a very small margin of profit. It is remembered that the Canadian companies not only erect and maintain freezers and store supplies of ice, build and supply the tug boats, are such a convenience to the fishermen in their fishing operations, furnishing supplies and in a multitude of ways facilitating their fishing operations, but they also have the responsibility of the marketing of the fish, and of maintaining the channels of business. These companies operate the fishing stations, supply the fish, and make advances to the fishermen without which the industry could not be carried on, and they do all this on a far less margin of profit than the middleman who merely sells the fish to the retail dealers.

"It will thus be seen where the price of fish becomes excessive, and we are of the opinion that fish caught in our Canadian waters should be sold to the retail dealers at the same rate per hundred pounds as it is sold to United States or middlemen. We had abundant evidence that retail dealers were refusing to buy fish from the fish companies for supplies of fish were refused.

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ground that, under the existing system of selling to middlemen, the fish companies decline to sell to the retail Canadian dealers. If it is possible, by some departmental measures, to carry out an arrangement whereby the fish companies shall sell directly to the retail dealers at the lowest possible prices, Canadians may then secure as cheap fish and as good quality as do the customers of the large United States companies.

"Under present conditions Canadians when buying fish actually pay a profit to four different persons, viz., (1) the fishermen (2) the wholesale fish dealer (3) the jobber or middleman (4) the retail fish dealer."

Fisheries Patrol

The matter of more rigid patrol of the lakes is one that will require more serious consideration than it has received in the past. There have been frequent allegations of incompetence concerning the inspectors, but when the circumstances under which these men have to work, are considered it is perhaps not so surprising that this work has been but imperfectly done. In the first place, the patrol boat used is too large and slow for such work, and gives early warning of its approach to all persons engaged in illegal operations. Besides, the inspectors are mostly residents who receive but small pay for their services, and can hardly be expected to take the risk of having the ill-will of their neighbors by forcing prosecutions. Then, too, the areas to be covered by the inspectors are much too extensive for thorough work. In this regard, the Commissioners report as follows:

"Few people are able to realize the vast extent of the area which the officers have to cover, and the immense waters which should be regularly patrolled if proper supervision is to be exercised. The scale on which the fishing operations is carried on, both in winter and summer, is most extensive, and it would appear that for interests so vast as the fisheries of Manitoba and Keewatin, there should be a division of labour and that one officer should not have to cover such an immense geographical area as the present conditions require. There should be some central inspector's office in the province, established where the principal officer could be consulted by parties on fishery business. He should have authority to issue licenses and save the serious delay which at present is so great an obstacle to the effective working out of the government's policy of protection and preservation of fish. He should make weekly returns to the department of the licenses issued and remit the fees collected. For the reasons which are apparent, we do not favour the present system of a numerous staff of poorly paid fishery overseers, and a still more inadequately paid staff of fishery guardians. The whole territory should be under the supervision of six or eight active and properly paid fishery overseers, who would have their patrols specified by the principal officer or district inspector."

Hatcheries Needed

That there is an ever increasing need of more fish hatcheries in Manitoba, and, at the same time, a more scientific operation of those already in existence there, seems to have been im-

pressed very strongly on the Commissioners. They assert that some of the hatcheries were not in operation at all for one or two seasons. This seems to have been mainly due to mismanagement in the matter of procuring spawn. While whitefish were being taken and shipped by the car load during the spawning season, the hatcheries either received no spawn at all, or received it in such bad condition that it was almost entirely wasted. Further, the Commissioners claim that the Selkirk hatchery is not an ideal one for the propagation of whitefish, which ever since its construction has been the principal fish included in its operation. They suggest that this hatchery be used for pickerel, a fish that is yearly becoming more valuable, and, as the Selkirk hatchery is centrally located, it could very well be used for a distributing centre. It was recommended that more pickerel, gold-eye and bass hatcheries be established. The latter fish, if they can be produced successfully, would be a valuable asset to the Province, as they make excellent game fish, in which the waters of Manitoba are singularly lacking.

**Biological
Investi-
gations**

Owing to the lack of accurate information, considerable haziness exists as to the habits and movements of Manitoba fish. The views of experienced fishermen are most contradictory on such important matters as the size at which whitefish first contain spawn, or reach the mature breeding stage. The food of the whitefish seems to be a matter still in doubt in the minds of the most practical men, and very little information is available as to the feeding and spawning grounds of the whitefish, pickerel, sturgeon, gold-eye and other commercial species of fish. To obtain this data the Commissioners advise the establishment of a biological station on lake Winnipeg or some other suitable place.

**Extensions
of Time**

Regarding extensions of time which the Department frequently importuned to make, the Commissioners comment as follows:

"The department is, at times, strongly pressed to temporarily modify the regulations, especially in regard to the length of the fishing season. Requests for extension are sent to Ottawa and urged with great force, owing, in some cases, to a serious shortage in season's catch of fish. It is pointed out, in behalf of the fishermen and the fish firms, that they were prepared to handle as large a larger catch of fish than usual, and that they will suffer serious if an extension of time be not granted to enable them to make up the deficiency in the catch. To this commission it appears strange that, during a season in which the fish appear, for some reason other to be especially scarce, requests should be made for an increased destruction of them, and that a longer time should be allowed because of the apparent scarcity of fish. In our opinion, when fish, for some reason, appear to be scarce, that is precisely the

that they should be conserved, and the extensions asked for appear, therefore, to be unwise and unnecessary from a fish protection point of view. Such extensions, we have information to show, have often proved of no benefit at all to the parties who asked for them. When an extension is asked and the season is lengthened it often results in fishing operations being continued after the stormy season has begun, entailing great loss of gear, and certainly a waste of considerable catches of fish. The seasons specified in the regulations should, in our opinion, be very strictly and closely adhered to, both in the interests of the fish supply and in the interests of the parties who are engaged in the fish industry.

New Regulations Desirable

"As we have pointed out in the body of our report, the existing regulations cover not only the province of Manitoba, but the very different waters of Saskatchewan and Alberta where the conditions are wholly unlike those of the Manitoba waters."

Hence, a totally revised set of regulations is necessary, and, in order to understand that a new set of regulations is being prepared specially for the more western provinces, we beg to recommend the following series of revised regulations for waters which we were commissioned to investigate and report upon. It will be noticed in this code of regulations which we suggest, that a number of provisions are dropped altogether which have long formed part of the Manitoba regulations, but the time has come for a thorough revision, and we, therefore, beg to recommend the following provisions as suited to the present requirements of the fisheries in question.

GENERAL

"(1) Fishing by means of nets or other apparatus without license or permit from the Minister of Marine and Fisheries is prohibited in the waters of Manitoba and the District of Keewatin.

"(2) No license shall be granted to any person unless he is a British subject, resident in the Dominion of Canada, and the actual owner of nets, boats and fishing gear for which the license is granted. Applications from residents living in the immediate locality of the waters applied for shall have the preference in the granting of licenses.

"(3) Any resident settler, including Indian, is eligible for an annual fishing permit to fish not more than one hundred (100) yards of gill-net for domestic use, but not for sale or barter. Such permit shall be issued free, and fishing under it shall be permissible at all times.

"(4) No license shall be transferable unless by special permission obtained from the District Inspector of Fisheries.

"(5) Every person holding a fishing license or permit shall, at the end of the fishing season, make a sworn return of his total catch of fish to the fishery inspector by whom the license or permit was issued.

"NOTE.—As there are two important fishing seasons, namely, the summer fishing season and the fall and winter fishing season,

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these returns should be made twice a year, namely, on or before September 30, for the preceding summer fishing, and March 31, for the preceding fall and winter fishing.

"(6) All boats, buoys and nets shall be legibly numbered, by means of tags or otherwise. Boats shall have their numbers painted in black on a white ground on either side of the bow, the figure or figures to be not less than 6 inches in height and the numbers on the buoys shall be so placed as to be readily seen without raising them from the water, and the numbered tags on the nets shall be so attached as to be visible when the nets are in boxes or on the net reel. The numbers for all such boats, buoys, and nets shall be furnished by the Inspector of Fisheries for the District at the time of the issue of the license.

"(7) Not more net shall be used or operated under any net license than is specified in the said license, and such net shall not be used or operated by any person other than by the licensee or person in whose name the license is issued.

"(8) Every person or firm buying fish from fishermen, or handling fish after capture by fishermen, shall make a true affidavit on or before March 31, of each year for the fall-caught and winter-caught fish, and on or before September 30, for summer-caught fish, such sworn return or affidavit to specify the kinds of fish bought or handled by such person or firm, and to state the exact quantities of each respective kind of fish purchased from the fishermen, such affidavits to be mailed to the Inspector of Fisheries on or before the dates named above.

"(9) Angler's permits. (The General Fishery Regulations dated October 14, 1907, which have hitherto applied to the Manitoba waters and to Dominion waters generally should continue to apply in the province of Manitoba)."

In addition, a number of special recommendations have been made dealing chiefly with close seasons, the nature of the nets that may be used in different waters, and other more or less technical matters.

FISHERIES OF BRITISH COLUMBIA*

The fisheries of this Province are exceedingly rich and are almost unlimited in promise. Although the fishing industry may be said to be now only in its infancy, the growth and development have been truly remarkable during the past few years. To a careful observer, however, this will appear small and insignificant in comparison with that which may be done along the same line in future years.

The province of British Columbia has a sea washed shore of 7,000 miles, with countless islands, bays and fiords forming safe and easily accessible harbours. Along this portion of the Pacific coast, and within the limits of territorial waters, there are fish and mammals in great abundance, while, apart from this immense salt water fishing area, there are, in the numerous lakes of the province, no less than 220,000 square miles of fresh water, affording the finest possible habitation for many kinds of valuable food-fishes.

Very little has been done, comparatively speaking, for the fisheries of British Columbia as a whole, and their importance claims the closer attention of the Government. On the Atlantic such valuable assistance as the erection and maintenance of bait-freezing establishments, and the granting of bounties, has been afforded. It would seem that the need of encouragement is especially marked on the Pacific, since there the demand for labour of all kinds is so great and other less precarious employments are so inviting. A great deal might be done, by means of special inducements, towards the upbuilding of the fishing industry here.

Of all the many branches of the fishing industry in British Columbia, the canning and packing of salmon yet remains *facile princeps*, and it is to be hoped, and may with reason be expected, that a continued plenitude of this valuable fish may be ensured by careful methods of conservation, by artificial propagation on a large scale and by the combined efforts of the Government and of the cannery men. All who are connected with, or interested in, the salmon industry fully realize that a plentiful future supply can be rendered a certainty only by the rigid enforcement of close season regulations, together with the operation of hatcheries on an extensive scale; for all are aware that unless a sufficient number of fish are permitted each year to reach the spawning grounds, the time will assuredly come when the sources of supply will have become depleted. This is particularly true of the sockeye salmon.

* This article was kindly contributed by the Attorney General's Department, British Columbia.

The former suicidal ideas maintained by many cannery men, both on the Canadian and American side of the international boundary, that the salmon business could not be permanent, and therefore, that every available sockeye should be intercepted and put into a can, are becoming greatly modified, if not altogether dispelled. There is great hope, therefore, that a satisfactory joint system of close season regulations may be adopted by the cannery men on the Fraser and those on the other side of the line—all working in unison towards a common end: the saving of the salmon industry. This would, indeed, be a "consummation devoutly to be wished."

A similarly satisfactory outlook for the future is now apparent in the other salmon districts of the Province: for this year (1910) a Special Boat-Rating Commission was appointed by the Minister of Marine and Fisheries at Ottawa with instructions thoroughly to investigate conditions in the northern districts, and to recommend an award of boats to be allotted to each division and to each individual cannery. This Commission consisted of men thoroughly acquainted with fishery affairs and eminently qualified for the duty entrusted to them. The results of previous efforts in this direction on the part of the cannery men themselves—all alive to the vital necessity of a limitation of boats—have been far from satisfactory. This fact led to a rating by the Provincial Government and, later, to the appointment, by the Dominion Government, of the above mentioned Commission, to make an award of boats for a period of years. The cannery men, weary of constant cavilling and dispute, welcome the promise of some definite settlement and, while it is unlikely that the award of this year's Boat-Rating Commission will be satisfactory to all, yet it would seem to be the introduction of a system by which the cannery men will better realize their position for the future, and by which the stocking of the spawning-beds each year will be rendered more certain.

There are, in the waters of British Columbia, the five known species of the genus *oncorhynchus*, termed the Pacific salmon. They are distinct from the salmon of the Atlantic, which are of the genus *salmo*. Structurally these fish are only slightly different, but their life history is totally dissimilar, and they are distinctly and positively placed. The great difference is presented in the fact that both sexes of all the species found in Pacific waters die shortly after spawning once. This remarkable characteristic, when for the first time brought to the attention of some Atlantic and European authorities, was discredited, as they did not generally know that the Pacific salmon was different from the *salmo* species, which, after spawning, does not die, but generally returns to salt water. Thus, while the Pacific fish are not salmon in a scientific sense, they are now the salmon of the world, because of their abundance and their fine canning qualities.

The five species of Pacific salmon, in the order of their commercial importance, are as follows:

- (1) The Sockeye, or Blueback (*Oncorhynchus nerka*).
- (2) The Spring, or Quinnet (*O. tshawytscha*).
- (3) The Coho, or Silver (*O. kisutch*).
- (4) The Dog Salmon (*O. keta*).
- (5) The Hump-back (*O. gorbuscha*).

SOCKEYE SALMON.—The sockeye run in all the mainland rivers, in some of the rivers of the west coast of Vancouver island, and in the Nimpkish river near the head of the east coast of that island. The abundance of this fish in the Fraser varies greatly with given years—known to the canners as the "big years" and the "poor years." Their movement appears to be greatest every fourth year and the run is poorer in the years immediately following. The causes which may have led up to this most remarkable feature have given rise to much speculation, and many theories have been advanced to account for them. None, however, are sufficiently satisfactory to be generally accepted. The periodicity in the run of sockeye, which is so pronounced in the Fraser, has no marked counterpart in any other river in the Province or on the coast.

The sockeye weighs from three to ten pounds, though specimens weighing seventeen pounds are recorded. The adults in salt water are free from spots, their backs are a clear blue and below the lateral line the colour is an immaculate white. In form and colour, they are considered the most beautiful of their family and the flesh is of a deep and unfailing red.

They enter the Fraser river as early as April, but are not taken till July 1st and their capture is, by regulation, confined to nets of 5½ inch mesh. The main run in the Fraser is looked for towards the latter part of July and is at its height during the first ten days of August.

The spawning period of the sockeye extends from August, in the headwaters, to as late as October and November in the waters nearest the sea, the spawning taking place in lake-falls or in lake-feeding streams.

Very little is known of the life of the young, or the length of time they live in fresh waters before seeking salt water, but the results of observations of late would tend to show that the seaward migration does not take place when the fish are of any one special age, since fry and yearlings have been noticed at the same time making their way towards the sea. Nothing is known of their feeding-grounds in salt water, as they are never found in the bays and inlets which distinguish the coast and where the spring and coho are so common. It is thought that their feeding-ground must be in the open sea.

SPRING OR QUINNAT SALMON.—This class ranks second in importance

in the waters of the Province and was the first, and for many years the only, salmon used for canning. The species attains to an average weight of from eighteen to thirty pounds in British Columbia waters, though fish weighing sixty to one hundred pounds have been reported. The head is rather pointed, and of a metallic lustre; the back is of a dark green or bluish color; while below the lateral line it is silvery. At spawning it becomes almost black; hence it is often spoken of on the spawning-grounds as "black salmon."

It is the most powerfully-swimming fish of all that seek the rivers of the Province, usually journeying to the extreme head of the watershed that it enters. It seems to prefer the most rapidly-moving streams, apparently avoiding the lake-fed tributaries. The colour of the flesh is from a deep red to a very light pink—at times almost white. This uncertainty of colour is mainly responsible for it being less generally used for canning. All specimens are examined by the canners before accepting them from the fishermen, the extremely pale-fleshed fish usually being rejected.

The quinnat enters the Fraser early in the spring and the run continues more or less intermittent until July. In the fall there is no pronounced run.

COHO SALMON.—This species is found in all of the waters of the Province and of recent years has become a considerable factor in canning operations. The bulk of the catch, however, is being shipped in ice to Eastern markets. Its average weight is from three to eight pounds, though heavier specimens are not uncommon. In colour, it is very silvery, greenish on the dorsal aspect and with a few black spots on the head and fins. In August and September the runs take place in the rivers on the north-west coast, and in September and October, in the Fraser.

Like the sockeye, the coho salmon travels in compact schools. It does not seek the extreme headwaters, but frequents both the streams and the lakes to spawn.

DOG SALMON.—These fish run in most of the rivers and coast streams late in the fall. The average weight is from ten to twelve pounds, but much larger specimens are not unusual. In provincial waters, they spawn close to the sea, ascending almost every one of even the minor coast streams. In the sea, they are dark silvery in colour, the fins being black; but during the spawning season they become dusky, with lateral lines of black. There is more or less gray and red colouring along the sides. The heads of the males undergo the most marked distortion, while the teeth in front become large and dog-like; it is from this latter characteristic that the species has derived its popular name. Until a few years ago these fish were not considered of any value, but they are now cap-

tured in great numbers by the Japanese who dry-salt them for export to the Orient.

HUMPBACK SALMON.—This is the smallest of the species of salmon found in British Columbia waters, averaging in weight from three to six pounds. In colour, it is bluish above and silvery below, while the back and tail are covered with oblong black spots. In the fall, the males are so greatly distorted as to give them their popular name. These fish run in abundance in the "big years," and then only every second year after, coming in with the last of the sockeye run. They are but little valued, though a considerable demand has sprung up during the last few years. With the development of the markets for cheap fishery products, a demand has come for all the varieties of salmon, with the result that the fishing season is now extended to cover the runs of all five species. This lengthening of the season is of marked benefit to the regular salmon fishermen, and with the development of the other fisheries, it is confidently believed that these hardy men may find ready employment during the entire year.

THE ARTIFICIAL PROPAGATION OF SALMON.—The following salmon hatcheries are in operation in British Columbia:

Bon Accord, Fraser river.
Pemberton, Lillooet district.
Granite creek, Shuswap lake.
Harrison lake.
Babine lake.
Stuart lake.
Lakelse lake, Skeena district.
Oweekayno lake, Rivers inlet.
Nimpkish river, Vancouver island.
and
Seton lake, Lillooet district.

The total number of these institutions does not by any means meet the requirements, and the necessity for many more is recognized by all who are familiar with the situation. The erection of other establishments of the kind, however, is now under consideration, and it may be expected that before very long a larger number will be in operation at the different points where spawning salmon are to be obtained each year in vast numbers.

Hatcheries for game fish, too, especially in the Upper Columbia region, are greatly needed. The vast amount of good that is accomplished by hatcheries towards preventing the depletion of the salmon supply and the building up of this industry can only be comprehended by a careful study of the results obtained elsewhere.

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PROVINCIAL FEES.—In addition to the fees charged by the Dominion Government, the provincial authorities impose the following charges:

- (a) For a salmon drift-net or gill-net license, \$5.
- (b) For a salmon drag-seine license, \$25.
- (c) For a salmon purse-seine license, \$5.
- (d) For a salmon trap-net license, \$25; also a tax of \$1 per thousand fish taken.

Halibut

The halibut of British Columbia have an enviable reputation, for they are less overgrown and of finer texture than the Icelandic and North Sea fish; a length of five to six feet and weight of 250 lbs. is exceptional for the British Columbia halibut. The waters between Queen Charlotte islands and the mainland, especially off Rose Spit, and off the west shore of Banks island, were at one time veritably overcrowded with halibut.

Very large fish were often taken then, some weighing 150 pounds, but the general weight now is only from 20 to 60 pounds. The halibut are scattered all over the Strait, but regular migrations have been noticed, and where the waters of Dixon entrance meet the currents, moving from the south through Hecate strait, and food appears abundant, the fish congregate in large numbers.

The method of fishing with steamers and schooners is practically the same as on the eastern coast and, with few exceptions, halibut men are easterners who formerly, when the fish were plentiful, operated out of Boston and Gloucester.

From the middle of September to the middle of March is the principal fishing period, but in May and early June many large halibut move into inshore shallows, especially on the east side of Graham island.

It is generally agreed that the British Columbian halibut banks have seriously deteriorated during the last few years, and it is essential that measures be adopted to save the supply from exhaustion—a fate that has befallen the banks of western and northern Europe and the Atlantic shores of Canada.

Oulachon

This small fish—about the size of a smelt—occurs in great abundance from the Naas river in the north to the Fraser river in the south, appearing from early March to the middle of April. The schools entering the northern estuaries—especially the Naas—are very large; they crowd in so thickly that the Indians, from an early period, have been accustomed to make large catches by crude methods, the chief of which is the use of a long pole with numbers of nails inserted about one and a half-inches apart and projecting like the teeth of a comb.

By drawing this implement quickly through the dense school of fish the Indian impales a great number, which he shakes off into his canoe; in a very short time he can obtain a boatload in this primitive manner. Seines are used in some localities, as also are small-meshed gill-nets.

The tissues of the oulachon are teeming with oil—so much so that it is called the "candle fish," for by simply inserting a piece of pitch through the centre of it when dried, it may be used as a candle or torch, the pitch burning like the wick of a well-filled lamp.

The Indians are accustomed to press out the oil into vats. It is greatly esteemed by them, although it quickly turns rancid and is very offensive in odour. It is consumed by them in the same way, and to the same extent, as butter is with more civilized folk.

Herring The superabundance of herring on the coast of British Columbia has been recognized from early times, but, as the local demand was insignificant, no herring fishery can be said to have existed until about thirty years ago. At intervals, and in a desultory way, various parties engaged in the herring industry and quantities were converted into oil and guano. Within the last ten years, however, the value of this fishery resource has been slowly realized.

Herring occur practically all along the coast as far as Alaska, though in sheltered areas, like the waters near Nanaimo, Ucluelet, Barkley sound, Virago sound, and Queen Charlotte islands, the schools appear to form solid phalanxes. At Nanaimo, they are plentiful from early in November to the New Year, vast schools appearing in February, while even as late as June immense quantities have been seen moving out in the strait of Georgia.

There are many methods of putting up herring, but the greatest demand is for the salted article in pickle, and there is no reason why the Province should not put up as large a pack of the best herring as Scotland, which produces annually 250,000 to 350,000 tons, valued, when pickled and ready for market, at no less than \$5,000,000 to \$6,000,000.

It will thus be seen that while the fisheries of Nanaimo are still in their infancy, the possibilities of the herring industry are large and, properly conserved and exploited, it will become a valuable source of revenue to the whole district.

Sturgeon The sturgeon fishery of the Province was neglected until recent years, but in 1897 the Fraser river inspector reported that "the sturgeon fishery has become a very important industry—the more important as it affords winter employment to a large number of resident fishermen who would otherwise spend their time in an idle or

unprofitable manner. The prices of the industry are upwards of \$50,000, the fish being dressed and shipped to United States markets."

It is doubtful if the sturgeon has, in any numbers, every frequented the northerly rivers of the Province. It is on the Fraser river alone that any fishery has been developed of much commercial value. They may be found in the river during most months of the year, but migrate from the sea to the fresh water in the early spring about the middle of April, or even as early as March. The Indians formerly were accustomed to take them by means of trawls with long lines and baited hooks. Gill-nets were likewise used. The Dominion Government some years ago, and for three or four years since, has been engaged in sturgeon fishing. In fact, so remunerative was the fishery that a large body of fishermen immediately engaged in it. The result that in three years the catch fell to one-fifth of the amount taken a short time before.

At the present time not more than 50,000 to 40,000 pounds of sturgeon are taken annually—or about twice the amount of the total Columbia river catch. Vast numbers of small fish are seen by the Fraser river salmon fishermen and this leads to the belief that, with the enforcement of the present Dominion Regulations, the fishery will, in due time, be restored to its former state. This is greatly to be desired, since the industry is carried on after the close of the salmon fishing and good earnings can be made.

Pilchard and Anchovy These two valuable species occur more or less abundantly in southern British Columbian waters. The first-named is caught along with the herring on the eastern and western shores of Vancouver island. It is also said to be very numerous in Barkley sound and adjacent inlets.

In its small, immature stages it is the "sardine" of France. Investigation on the Pacific Coast reveals the resorts of these fish, and shows that a canned sardine industry which could successfully compete with the greatly esteemed European article is possible.

That the true anchovy is a British Columbian fish has long been known; but the migrations of this valuable species are at present not ascertained. Once known, however, the British Columbian anchovy could be prepared as a paste to compete in markets which are at present supplied by the Mediterranean.

Smelt There are two varieties of smelt common in the markets—the *Osmerus thaleichthys* and the *Hypomesus pretiosus*. They are both in brisk local demand.

Cod

There is practically no true-cod industry in the Province, though the other species of this genus abound. This may be due to the fact that the true-cod does not occur in sufficient quantities to justify large outlays on its exploitation. The shores and fishing banks farther north in Alaska, however, yield it in abundance, bringing in large sums of money annually to those engaged in the industry.

As long ago as 1880, the attention of the Government was called to the presence of this food fish and men who were inspecting and reporting on the resources of the British cod-banks became very confident that the Pacific cod-fish is the same as that caught in the Atlantic, and saw no reason why, in the course of time, and with care and attention, it should not become as valuable and important on this side of the continent as the Newfoundland fish in the East. The reason that this enterprise has, so far, not been extensively entered upon is probably due to lack of investigation.

Before the cod fishery can be developed in British Columbia, information is necessary and the Marine Biological Station will have no task more important than that of ascertaining where the true-cod abounds, the nature of its food, migration and spawning habits.

This delicious and much-sought-after fish abounds in the northern waters of the Province, especially along the western shores of the Queen Charlotte islands. It favours deep water, especially depths of from 70 to 90 fathoms, though it is also found at 20 to 250 fathoms. It is never caught in the surface waters and avoids shallows.

It is caught mostly in the winter months. The black cod is a delicious food-fish, of firm and flaky texture, being white in colour and rich in flavour. Owing to its rich oily nature, it is far more appetizing than the drier and firmer true-cod. On the table it bears a distinct resemblance to a large whiting—that is, the true European whiting—a fish wholly differing from the inferior so-called whiting of the western waters.

It is caught with very long lines, each carrying 120 to 150 hooks fixed on snoods at regular intervals. Great care has to be exercised in taking the fish off the hooks as it is very tender-mouthed.

Investigation is absolutely essential in the case of this species also. The determination of the spawning season, the nature and location of the spawn and fry are important factors in the framing of regulations to preserve and develop this industry.

Minor Varieties

A number of edible fishes abound along the rocky shores of the Province, which are used chiefly to supply the local markets. The cultus cod is the principal of these minor fish; it weighs from four to ten pounds and is caught by means of baited hooks and by

COMMISSION OF CONSERVATION

drag-seines. The red cod has more the features of a bass than a cod-fish, and in California is frequently called "sea-bass." Its weight ranges from three to twelve pounds. Several other bass-like fishes are largely sold; one species, generally styled the red rock cod, being a most excellent table fish.

There are no soles in British Columbia, the fish that is sold as such being a species of flounder. The latter is, however, a very choice table fish. It is very small, seldom exceeding a pound or so in weight.

Lobsters During the past few years, efforts have been made to establish the Atlantic lobster in Pacific Coast waters and several consignments have been sent and planted at various points.

As far as can be ascertained at present, and from the opinions expressed by those charged with the work, there seems little doubt that this valuable crustacean will thrive in its new surroundings, and that the nucleus of an additional branch of the British Columbia fishing industry has been formed with its introduction. Great difficulty, however, will attend the conclusive proof of these experiments for some time, the lobster being very migratory in its habits.

In June, 1905, lobsters to the number of 1,025, were shipped west from Halifax to Vancouver in charge of an official who was thoroughly conversant with the handling of live lobsters. These were safely deposited at various points, but what ultimately became of them is not as yet definitely known.

Once again, 1,620 lobsters were shipped, in the spring of 1908, to the west from Halifax with practically no loss. The officials looked after the planting of them with the utmost care, and in order that they might have some idea of how the lobsters would stand the introduction into new waters, large crates were put down and the lobsters deposited in these. After some weeks they were examined and the lobsters found to be in a perfectly healthy condition. They were then distributed at different places on the coast.

Oysters Shipments of Eastern oysters have been made in the same way, and on re-examination some time after planting, they were found to be perfectly healthy and to have grown and prospered in their new surroundings. Plantings were made both in bays and inlets on the coast of the mainland and also around Vancouver island and there is every reason to believe that so far as growth and development are concerned, the cultivation of the Eastern oyster in the province of British Columbia is successful.

From the opinions of some of those engaged in this business, however, it would seem that the water on this coast is too cold for the oysters to propagate, since, in most cases, the long sandy stretches, to which they

have been accustomed in Eastern waters and which are essential to the raising of the temperature for successful propagation, are lacking. Nevertheless, the business of planting the young oyster and marketing the fully developed product is found by those engaged in it to be very profitable. The same difficulty with regard to the propagation of the lobster may be found to exist, but this has yet to be fully determined.

A profitable business is carried on in the cultivation of the native oyster which is smaller than, and inferior to, the Eastern variety.

Crabs Very fine crabs are to be obtained in large quantities along the coast of the Province, and there is a brisk local demand for them. This industry is by no means exploited to the full, however, as the Indians, by whom the bulk of the crab-fishing is done, are occupied with the salmon fishing throughout the summer and fall.

The demand for crabs in the local markets far exceeds the supply and this, despite the fact that they are to be found in such abundance. Saanich arm and the Lagoon at Esquimalt are teeming with crabs and often, in the summer, pleasure parties go out for the express purpose of catching them. A hundred or so thus taken in an afternoon is no uncommon thing.

Some idea can thus be obtained of the numbers that are to be caught by practical fishermen when novices are able, for the pure pleasure attached to the capture, to take them in such numbers.

Prawns As in the case of crabs, very little attention is given to the systematic capture of prawns, in spite of the constant local demand for them. All that are offered by fish dealers are quickly bought up; for the prawns that are taken in provincial waters are of exceptional quality.

Most of the prawn fishing is done around Vancouver; very little is done off Vancouver island, though this is not because they do not exist there, but simply because fishermen cannot be found to undertake their capture. Nearly all the prawns sold by the fish dealers in Victoria are either obtained from Vancouver or Seattle, and it is only occasionally that fishermen bring them in. When they do, their catch is readily taken off their hands by the local dealers.

Clams Among the many fishery resources of the Province that are not appreciated at their real value is that of the clam industry. There is an unlimited market for these shell-fish in the United States, both in a canned and a fresh condition.

The existence of vast clam-shell beds at numerous points along the British Columbian coast—indeed, wherever Indian communities have

established themselves—shows how much the native population relied upon this succulent food.

The clam supply in British Columbia is most remarkable: productive areas stocked with clams of various species occur practically at all points. There are several establishments for canning them, located at different points in the Province.

The fee for a clam fishing license is \$2.00.

Abalone It has long been known that the abalone occurs plentifully in certain areas off the British Columbian shores, especially along the coast of the Queen Charlotte islands. The soft animal contents are valuable for food, while the shell itself is important for ornamental purposes, for making pearl buttons. The beautiful iridescent covering of the fish has been always in great demand, especially by German button makers, curiosities dealers and others.

These molluscs occur at a depth of from six or eight feet to considerable depths, and at the greater depths are taken by fishermen wearing diving suits and helmets. The abalone is in great demand in China for soups.

The following is a list of the more important species of *edible mollusca* found in British Columbia waters.

<i>Ostrea lurida</i> , Carpenter	Native oyster.
<i>Pecten caurinus</i> , Gould	Scallop.
<i>Pecten hastatus</i> , Sby	Scallop.
<i>Pecten rubidus</i> , Hinds	Scallop.
<i>Mytilus californianus</i> , Conrad	Mussel.
<i>Mytilus edulis</i> , Linné	Mussel.
<i>Cardium corbis</i> , Martyn	Cockle.
<i>Saridomus gigantous</i> , Desh.	Clam.
<i>Macoma inquinata</i>	Clam.
<i>Macoma nasuta</i> , Conrad	Clam.
<i>Rerithacrus secta</i> , Conrad	Clam.
<i>Siliqua patula</i> , Dixon	Razor clam.
<i>Tresus nuttalli</i> , Conrad	Large clam.
<i>Mya arenaria</i> , Linné	Soft-shell clam.
<i>Paphia staminea</i> , Conrad	Hard-shell clam.
<i>Panopaea generosa</i> , Gould	
<i>Penitella penita</i> , Conrad	
<i>Penitella ovoidea</i> , Gould	
<i>Zirphaca Gabbi</i> , Tryon	
<i>Purpura crispata</i> , Chemn	Whelk.
<i>Purpura lima</i> , Martyn	
<i>Purpura saricola</i> , Val	

<i>Littorina sitkana</i> , Phil	Periwinkle.
<i>Littorina scutulate</i> , Gould	Periwinkle.
<i>Acmaca personata</i> , Esch	
<i>Acmaca patina</i> , Esch	
<i>Acmaca pelta</i> , Esch	
<i>Acmaca mitra</i> , Esch	
<i>Haliotis Kamtschathkana</i> , Jonas	Abalone or Ear-shell.
<i>Cchitons</i> (<i>Cryptochiton</i> , <i>Katherina</i> and others)	
<i>Octopus punctatus</i> , Gabb	Cuttlefish.

Whaling Many species of whales occur off the coast of British Columbia. In fact sperm whales are occasionally captured, some of which have been gigantic specimens exceeding a hundred feet in length. In former years, the schools of whales were of no value to the Province, but the action of the Dominion Government, by its encouragement of whale factories on modern principles, will create a large and remunerative industry all along the coast.

One of these Pacific whales will yield, on an average, 50 to 80 barrels of oil and $4\frac{1}{2}$ to 5 tons of dried guano; and furnishes numerous other products when treated by the most recent mechanical and chemical methods. Oil fertilizer, leather, glue, canned "beef" (prepared whale-fish put up in beef cans) and even condensed milk from the female whale are among the products yielded by these monstrous creatures.

The companies operating make tremendous profits since, by the latest improved methods, it is possible to take the large and very numerous inferior whales that were formerly neglected; while the adoption of mechanical reduction processes secures the utilization not only of the blubber and whalebone, but also of the flesh, blood, massive viscera, etc., formerly cast away, to be devoured by voracious sharks, seals, and other such inhabitants of the deep.

Inland Lakes Fisheries The Inland lakes of British Columbia, while being eminently suited to the production of food fish of many kinds, do not, at the present time, supply them in any large quantities, with the exception of trouts. For some time, however, the Government has been considering the introduction of the true whitefish (*Coregonus clupeiformis*) of the Great lakes, into this Province. The native whitefish exists in most of the British Columbia lakes, notably Atlin lake, but it seldom attains a weight exceeding two pounds, and is not as good a mercantile commodity as the whitefish that is indigenous to the Eastern lakes. There seems to be no reason, moreover, why the latter fish should not thrive in the lakes of this Province, the most accessible waters for the planting of it being the Kootenay, Okanagan, Shuswap and Harrison lakes. The whitefish has prospered wonderfully in lake

Manitoba and its introduction should be attended with like success in British Columbia.

If experiments in this direction prove to be successful, the commencement of a large industry will have been made, since not only will there be a great market in British Columbia, but also in the North West.

Injurious Fishes The principal natural causes of destruction to the fish of the Province, and the salmon in particular, are the dogfish and the hair-seal. Both of these pests exist in great numbers, the seals crowding the estuaries of the rivers and causing tremendous havoc among the incoming salmon. In some years especially, the loss of fish due to the depredations of seals is very extensive. The danger attending the wholesale shooting of these marauders in the Fraser estuary, however, renders their extermination extremely difficult, but it is to be hoped that some scheme may be devised that may prove effective in this direction.

The dogfish, too, are responsible for a large amount of destruction among the fish, and, unfortunately, there has so far been no systematic effort made to lessen the destructive depredations of this voracious outlaw. Establishments such as exist on the Atlantic, for the reduction of dogfish, are urgently needed.

Other causes of destruction among fish, such as the dumping of mill refuse into streams and lakes, are being overcome as constant supervision is exercised by Government officials, the offenders being dealt with accordingly.

The swarms of trout which follow up the spawning salmon are a source of great trouble to hatchery officials for they ravenously devour vast quantities of salmon eggs, thereby working great havoc in the hatchery streams.

There are so many causes of destruction among the eggs and fry of salmon that everything possible should be done to lessen the destruction while such strenuous efforts are being made to preserve the salmon industry by means of hatcheries. The trout is a very useful and valuable fish in its proper place, but its presence is by no means to be desired where salmon are spawning.

British Columbia Game Fish SALMON—It seems to have been the general opinion in the past that the sport of salmon fishing in this country was not worth trying, but of late years it has been discovered that this is erroneous and people have been coming here from all over the world to fish. It may be true that the salmon generally will not rise to the fly, but under certain conditions of the water, the small species called

the coho has been known to rise freely, and there are several authentic cases of spring salmon having been caught in like manner.

However, even if the fish cannot be caught with the fly, there is no doubt that they will give good sport to those who like trolling. The coho, though ranging in weight only up to about ten pounds, is a most lively fish, and by the use of a rod and light tackle gives excellent sport before he is gaffed.

Campbell river has, at present, the name of being the best for game fishing, though there are many other places as good in the Province. The fishing there begins in July. At first, only the cohos are to be caught and they come in great numbers. About the end of July, however, the big tyee salmon appear; they average about 45 pounds and have been caught on a rod up to 72 pounds.

The best salmon fishing is obtained from January to April. At this time of the year, the spring salmon are to be caught and they are then in the pink of condition and afford excellent sport, though the catch may not be as large as it is possible to make later on in the year. The man who has time then to go to Port Simpson will be well rewarded.

Barkley sound also has good fishing; while within easy reach of Vancouver, good spring fishing can be had at Pender harbour and Sechelt.

During September and October the cohos run in great numbers in Vancouver and Victoria harbours and six or seven fish in an afternoon's fishing is quite a common occurrence. A few spring salmon are also caught at this time.

Trout Attempts have been made to give a list of the lakes and streams of the Province to be recommended for fishing, but this is quite hopeless as it is difficult to discriminate. As with everything else, there are favorite localities, but in respect to trout alone, nearly every part of the Province has its attractions. On Vancouver island, one of the best trout streams that is easy of access is the Oyster river, a short distance north of Comox. The Campbell river stands out prominently also as a good trout stream. Closer to Victoria, Shawnigan lake and Cowichan river and lake afford excellent fishing. On the mainland, good fishing can be obtained at Frederic arm, while from Sechelt the streams at the head of the narrows and Salmon arm can be reached. Close to Vancouver, Capilano and Seymour creeks will still give a few splendid fish. The Squamish can also be reached in a short time from the same place. Going farther into the interior, Yale and Hope have good streams, and Sevonas, when the water is in condition, will furnish excellent sport. Taking the whole country into consideration, it is difficult to beat the Kootenay for trout since almost every stream there has good fishing and some of them contain enormous charr.

In northern waters, nearly all the streams have quantities of grayling, ranging from one to two pounds in weight. They rise readily to the fly, and, while hardly to be compared with the trout for sport, are well worth catching. Near Atlin the fishing is excellent, and at Taku, which is just across the lake from the town, a basket of fifty fish would not be considered any very large catch.

Cold Storage There are several large cold-storage plants in operation in the Province which greatly facilitate the handling of salmon and halibut. Three of these establishments are situated on the Skeena river, being operated in conjunction with canneries. There are also two on the Fraser river, one of these—owned by the British Columbia Packers' Association—being an especially large, up-to-date and well-equipped establishment.

Revenue and Expenditure The following shows the revenue and expenditure of the Government of British Columbia in respect of fisheries for the year ending March 31st, 1910:

REVENUE

Licenses issued,—

12 trap at \$25	\$ 300.00
75 cannery or fish-packing at \$100	7,500.00
4,708 fishing at \$5	23,540.00

Total revenue\$31,340.00

EXPENDITURE

Total expenditure\$21,728.03

Salmon
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PRODUCTION OF CHIEF COMMERCIAL FISH

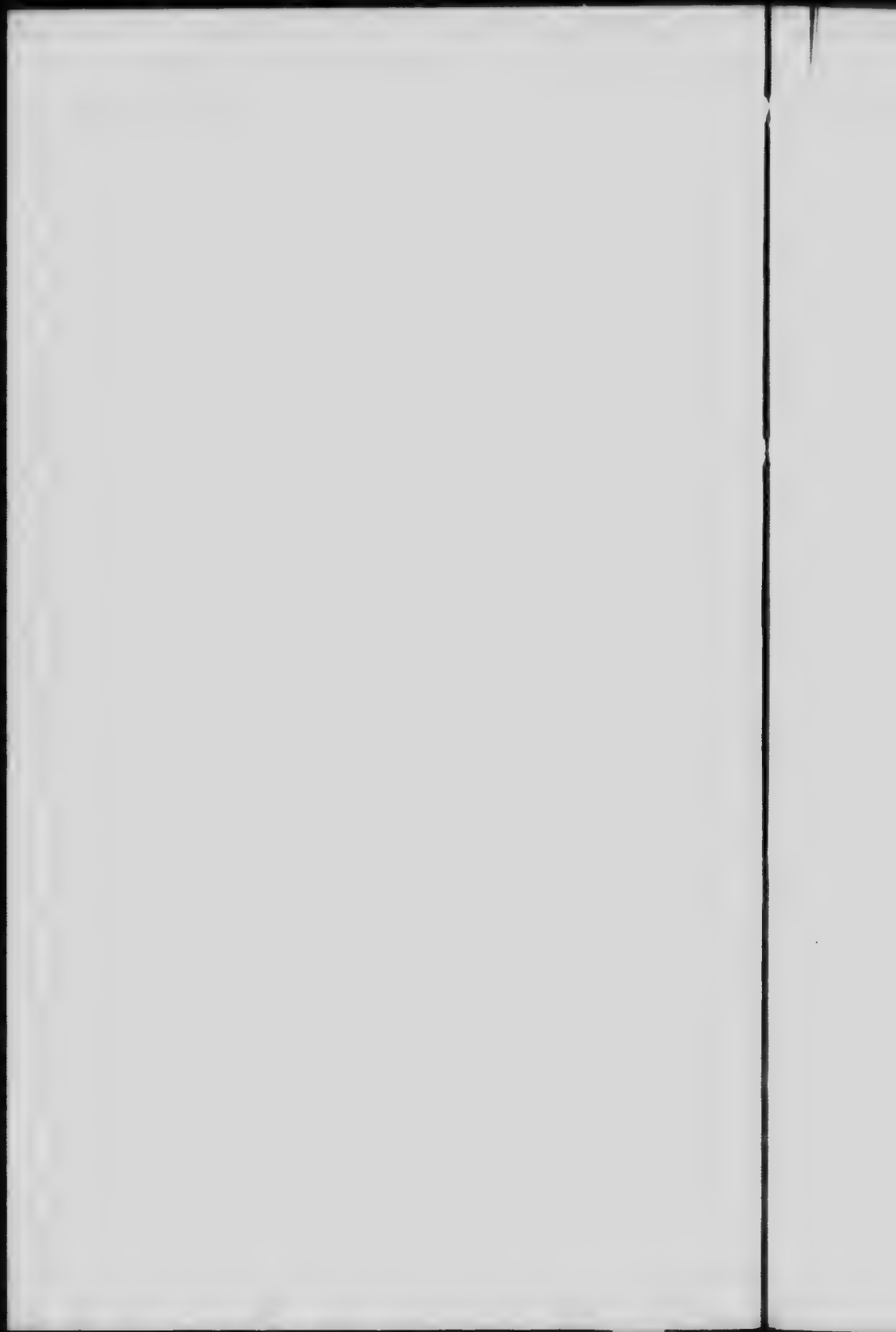
Figures given in pounds

Kind of Fish	Nova Scotia	New Brunswick	Prince Edward Island	Quebec	Ontario
Salmon	646,309	1,527,090	4,120	994,602	.....
Cod	56,150,971	8,400,200	2,175,000	18,276,900	.....
Lobsters	11,990,422	3,988,560	2,440,898	1,046,420	.....
Herring	36,278,161	37,495,620	2,434,719	4,507,910	9,300,000
Halibut	1,259,713	113,500	1,370	151,725	.....
Whitefish . . . . .	.....	2,000	.....	27,780	4,600,000
Mackerel	10,007,510	431,400	308,000	1,329,800	.....
Smelts	718,354	7,268,900	857,550	263,400	.....
Haddock	21,289,042	3,075,500	163,700	199,700	.....
Pickrel . . . . .	.....	63,300	.....	77,625	3,100,000
Trout	188,212	201,300	25,960	154,750	5,100,000
Sardines . . . . .	.....	53,267,900	.....	6,000	.....
Hake	9,897,293	2,291,515	941,110	35,400	.....
Pike . . . . .	.....	.....	.....	73,000	2,100,000
Clams, Quahaugs, Scallop	3,558,400	12,583,800	1,334,200	24,000	.....
Pollock	9,477,500	2,643,000	.....	.....	.....
Oysters	343,200	3,868,000	2,703,800	.....	.....
Eels	590,200	636,800	110,000	567,400	.....
Alewives	1,970,000	3,095,000	100,000	.....	.....

ICIAL FISH, BY PROVINCES, IN 1909

ven in pounds)

Ontario	Manitoba	Saskatchewan	Alberta and Yukon	British Columbia	Total
			138,574	66,485,070	66,795,765
				1,082,700	86,085,771
					19,466,300
9,388,298				58,449,700	148,554,408
				21,706,000	23,232,308
4,679,235	1,062,100	1,930,000	1,104,308		12,405,423
					12,076,710
				314,700	9,422,904
					24,727,942
3,124,972	5,750,400	183,000	77,330		9,275,627
5,162,912	4,500	110,000	58,750	212,600	6,118,984
					53,273,900
					13,165,318
2,345,296	3,067,100	815,000	618,341		6,918,737
				1,386,600	18,887,000
					12,120,500
				792,000	7,707,000
34,102					1,938,502
					5,166,000



PRODUCTION OF PRINCIPAL COMMERCIAL FISH IN CANADA, 1885-1909

(Figures given in pounds)

	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Salmon.	<i>a</i>	12,031,281	16,273,665	15,242,192	25,773,839	24,688,994	20,254,511	17,712,029	37,893,950	30,337,895	34,553,127	35,999,015	55,270,191	31,042,125	45,003,208	40,435,999
Cod.	107,739,300	108,141,390	107,888,000	105,087,700	90,456,000	85,773,400	84,983,800	88,018,400	1,078,078	93,969,400	80,806,300	81,129,800	97,616,700	71,669,700	93,590,700	90,081,700
Lobsters.	27,299,038	33,758,421	19,485,687	22,173,773	21,131,233	25,055,984	26,910,157	24,549,498	28,369,213	28,463,693	27,093,592	28,882,638	36,313,654	45,568,994	25,955,110	29,462,190
Herring.	<i>a</i>	<i>a</i>	<i>a</i>	<i>a</i>	143,934,881	97,559,806	92,697,450	84,768,515	82,641,794	113,914,821	123,901,698	131,304,426	112,925,772	92,863,858	122,060,036	95,132,848
Halibut.	1,735,917	1,563,872	1,711,519	1,368,808	1,903,115	1,525,130	2,719,697	3,430,809	2,840,619	3,481,276	3,977,350	3,672,625	3,177,138	3,897,765	3,789,605	6,190,129
Whitefish.	3,988,560	6,899,223	6,846,856	10,189,856	9,806,422	11,176,582	11,763,841	23,776,763	21,390,289	14,854,170	14,249,399	13,374,000	11,268,889	10,670,651	11,024,178	12,466,258
Mackerel.	29,690,134	30,458,492	26,430,641	13,155,363	13,186,112	20,302,764	28,018,181	19,145,130	15,754,497	12,420,472	9,179,036	9,980,972	6,419,058	7,656,742	8,266,659	18,194,772
Smelts.	5,982,358	7,209,888	5,923,418	3,723,772	5,011,058	4,735,517	5,552,101	4,719,193	8,283,481	8,097,079	9,022,157	9,970,805	8,563,389	8,403,839	8,833,260	9,500,105
Haddock.	1,937,200	21,347,400	21,600,300	23,718,300	12,566,200	13,301,700	15,017,000	16,757,800	13,323,400	14,217,490	12,306,800	13,628,200	27,706,315	20,411,123	20,420,828	17,959,925
Pickering.	2,120,003	2,624,785	2,412,549	3,484,416	3,264,591	3,142,189	2,990,679	3,893,190	3,848,304	7,610,425	7,678,411	6,897,810	7,453,137	5,737,277	6,416,994	6,055,829
Trout.	6,406,449	5,538,413	5,293,565	5,717,460	5,941,893	6,651,806	6,939,243	7,315,219	6,504,639	7,926,883	7,134,116	6,950,986	5,544,527	7,147,965	8,887,606	6,816,030
Sardines.	29,072,500	36,813,500	26,667,000	8,470,833	11,902,000	<i>b</i>	<i>b</i>	<i>b</i>	20,425,800	27,365,600	37,617,800	17,396,200	31,661,000	36,367,000	45,670,400	23,031,600
Hake.	5,671,067	4,191,743	6,034,463	12,267,057	11,950,889	9,501,054	12,524,575	11,755,217	10,842,339	10,320,700	7,390,331	9,550,667	13,898,830	14,859,707	24,136,632	20,816,861
Pike.	1,022,620	1,438,664	1,161,969	1,500,878	1,743,444	1,691,702	1,811,357	9,682,570	8,737,605	3,079,484	3,592,975	3,594,790	3,883,383	3,653,981	5,838,437	3,178,688
Clams, Quahaugs and Scallops.	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	4,004,400 ^c	3,958,200 ^c	<i>b</i>	429,200 ^c	<i>b</i>	<i>b</i>
Pollock.	6,529,000	7,904,500	10,290,200	12,107,100	7,719,600	6,838,700	8,124,800	7,429,400	8,052,700	8,875,800	5,950,700	8,878,100	18,865,600	7,235,400	12,154,300	10,812,500
Oysters.	11,426,400	12,581,000	12,272,000	11,246,800	12,609,800	11,335,200	12,206,400	11,190,600	10,216,000	9,025,400	9,534,600	9,714,800	8,944,400	10,731,200	8,102,600	8,384,000
Eels.	2,737,755	3,107,296	2,830,508	6,108,945	2,798,473	2,902,851	1,699,496	1,884,955	2,592,950	2,546,950	2,906,070	2,504,135	2,477,683	2,175,365	2,013,665	2,269,781
Alewives.	7,947,600	6,777,400	6,549,400	5,713,000	7,494,000	8,553,200	8,623,400	7,536,800	9,456,200	12,694,000	9,621,600	10,523,200	9,483,000	7,971,200	6,765,400	8,100,600

a Information given in numbers of fish, not pounds, and cannot therefore be reckoned in terms of weight.

b No returns made for these years.

c Clams only.

OF PRINCIPAL COMMERCIAL FISH IN CANADA, 1885-1900

(Figures given in pounds)

1900	1901	1902	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	
435,999	73,707,656	47,431,358															Salmon
81,700	100,781,200	100,520,600	5,999,015	55,270,191	31,042,125	45,003,208	40,435,999	73,707,656	47,431,358	36,353,388	44,334,890	84,830,030	54,822,666	49,670,087	44,793,018	69,795,765	Cod
62,190	26,476,104	23,553,521	1,129,800	97,616,700	71,669,700	93,590,700	90,081,700	100,781,200	100,520,600	83,929,800	80,832,086	76,065,700	69,566,795	76,625,200	75,827,100	86,085,771	Lobsters
132,848	99,268,068	87,348,099	8,882,638	36,313,654	45,568,994	25,955,110	29,462,190	26,476,104	23,553,521	21,456,858	21,867,088	25,899,024	20,241,764	18,409,510	20,748,797	19,466,300	Herring
190,129	6,790,711	9,962,917	1,304,426	112,925,772	92,863,858	122,060,036	95,132,848	99,268,068	87,348,099	88,963,215	88,826,454	96,000,920	109,017,847	98,465,857	130,045,524	148,554,408	Halibut
166,258	13,843,945	14,415,220	3,672,625	3,177,138	3,897,765	3,789,605	6,190,129	6,790,711	9,962,917	11,420,128	14,486,145	10,618,062	15,665,410	15,578,985	19,214,013	23,232,308	Whitefish
194,772	16,459,015	9,600,376	3,374,000	11,268,889	10,670,651	11,024,178	12,466,258	13,843,945	14,415,220	14,034,420	15,468,740	14,548,310	12,293,710	8,853,660	10,358,734	12,405,423	Mackerel
500,105	9,717,479	9,170,240	9,980,972	6,419,058	7,656,742	8,266,689	18,194,772	16,459,015	9,600,376	18,562,526	8,302,305	11,015,868	15,320,025	11,344,740	16,113,940	12,076,710	Smelt
959,925	22,704,669	17,783,783	9,970,805	8,563,389	8,403,839	8,833,260	9,500,105	9,717,479	9,170,240	9,616,075	8,971,576	8,602,950	8,459,006	10,470,324	7,501,905	9,422,904	Haddock
555,829	8,902,082	10,197,815	13,628,200	27,706,315	20,411,123	20,420,828	17,959,925	22,704,669	17,783,783	17,573,383	18,687,000	24,195,184	21,521,366	22,759,735	20,573,219	24,727,942	Pickarel
816,030	6,946,360	6,543,053	6,897,810	7,453,137	5,737,277	6,416,994	6,055,829	8,902,082	10,197,915	10,233,340	10,757,640	10,966,825	9,924,779	7,589,302	6,298,011	9,276,627	Trout
331,600	49,171,200	34,422,300	6,950,986	5,544,527	7,147,965	8,887,606	6,816,030	6,946,360	6,543,053	7,609,927	8,215,796	8,288,878	8,027,177	6,944,218	7,211,246	6,118,984	Sardines
816,861	11,772,182	10,188,765	17,396,200	31,661,000	36,367,000	45,670,400	23,031,600	49,171,200	34,422,300	39,047,900	67,079,200	72,423,200	49,450,200	56,300,000	62,181,600	53,273,900	Hake
178,688	6,427,685	6,599,530	9,550,667	13,898,830	14,859,707	24,136,632	20,816,801	11,772,182	10,188,765	10,179,061	44,398,333	17,483,105	12,763,800	18,498,995	18,530,273	13,165,318	Pike
b	b	b	3,594,790	3,883,353	3,653,931	5,838,437	3,178,668	6,427,685	6,599,530	6,325,425	6,963,900	6,337,860	5,625,500	5,677,730	5,539,726	6,918,737	Clams, Quahaugs and Scallops
812,500	11,357,900	12,529,100	3,958,200c	b	429,200c	b	b	b	b	b	b	b	b	b	137,901,400	18,887,000	Pollock
384,000	8,824,400	7,458,400	8,878,100	18,865,600	7,235,400	12,154,300	10,812,500	11,357,900	12,529,100	12,629,600	11,787,900	16,151,600	14,366,200	13,772,500	11,320,100	12,120,500	Oysters
269,781	2,268,470	1,997,908	9,714,800	8,944,400	10,731,200	8,102,600	8,384,000	8,824,400	7,458,400	7,151,400	7,597,400	6,889,800	6,471,000	5,459,800	7,005,400	7,707,000	Eels
100,600	6,971,400	9,312,800	2,504,135	2,477,683	2,175,365	2,013,665	2,269,781	2,268,470	1,997,908	2,248,450	2,417,900	2,396,560	2,403,410	2,173,600	2,068,395	1,938,502	Alwives
			10,523,200	9,483,000	7,971,200	6,765,400	8,100,600	6,971,400	9,312,800	6,682,200	7,780,800	6,982,000	6,311,600	5,978,400	5,588,000	5,166,000	



